GAS JOURNAL, NOV. 20, 1940

VOL. 232 92nd YEAR No. 4044

EDITORIAL NOTES

COAL

WE think that never before has the public realized the extent to which gas service enters into daily life. Of course, the circumstances which have forced this realization are to be regretted. " Enemy action " has not been, and is not, pleasant. Its effects would have been more disastrous and distressing, though, had it not been for the foresight displayed and preparations made by the Gas Industry—in common, we would add, with other public utilities—to render the best possible service in spite of grave difficulties and incalculable obstacles. In peacetime gas simply did not fail—in fact, this was the Industry's proud boast. Since August of this year gas supply has on occasion in some places temporarily " failed." Considering the odds, however, temporary cessation of supply has been remarkably rare, and the efforts made by gas undertakings concerned to remedy defects and restore as speedily as possible the *status quo* have, to say the least, been praiseworthy. Experience gained during the past three months will make it the easier to maintain that desideratum—" business as usual."

We are thinking at the moment primarily of coal. The summer months have gone. From the point of view of weather it has been a most favourable summer, and we hope that the opportunity has been taken by every gas undertaking to lay in maximum stocks of coal, irrespective of transport difficulties. We hope that every gas undertaking has shown prescience, has looked ahead to the coming winter with its long hours of darkness, when for all purposes in the home gas will be regarded as a special boon, when for the heat requirements of armament factories it will be a factor essential to victory over the Germans. We know that, compared with June last, the general situation as regards coal stocks by gas undertakings has greatly improved, though we are somewhat chary about taking average figures as a reliable criterion. It seems to us that some undertakings have been far more active than others in this vital question of looking ahead. Those undertakings which have made their wants known and have persisted in their demands have had their requirements met—we do not say as to coal quality, which is quite another matter, and outside the scope of the present note, but as to coal quantity. We know too, that there are undertakings which have been surprisingly and depressingly dormant, undertakings which have exhibited neither prescience nor persistence, and have looked upon the matter with erstwhile peacetime eyes rather than facing the cruel facts of a hostile world.

We say " surprisingly dormant " because of the steps taken months ago by the central organization of the Gas Industry in collaboration with the Government to make the path as least thorny as possible and ensure that all undertakings should face the winter with ample stocks of coal—stocks in amount according to new and likely demands occasioned, for instance, by efflux or influx of population, increased or impending industrial load. It can be said without any hesitation that the Mines Department has collaborated well with the Industry and has interpreted its needs sympathetically. It can be said without hesitation, too, that the efforts made by the National Gas Council have been unrelaxing and singularly successful. In brief, if, as we believe, there are some gas undertakings without adequate coal stocks to cope with the coming winter months with a sense of security and without any fear and trembling, it is their own fault. We would add that those undertakings have still time to lay in stocks of coal, and that the advice and active assistance of the National Gas Council are there for the asking.

WORKS SAFETY IN WARTIME

EVER since it became a major public utility the Gas Industry has recognized the vital importance of accident prevention, and both in the gas-works and in the factories that produce its plant and appliances the standard of safety has always been of a high order. To-day, in the nation's drive for victory, the Industry, in common with many others, is encountering new circumstances involving an influx of new workers unaccustomed to the hazards of industrial life and the return of others who have lost touch with works routine. At the same time there is the abnormal pressure of war conditions and an imperative need for avoiding loss of time to the individual worker and loss of production in the workshop. Accordingly a particular duty devolves on the management to take even more than ordinary care for the protection of workers in their charge.

With these points in mind, the Minister of Labour and National Service has arranged for the further development of that side of the Factory Department's duties dealing with the prevention of accidents and education for safety. In accordance with the policy of using to the full the services of existing organizations, he has asked for the help of the National Safety-First Association, in order that its experience may be grafted on to that of the Factory Department. The result of this collaboration has been the issue of a booklet entitled " Works Safety in Wartime," which deals with the problem in three parts. Part 1 outlines a service of literature—pamphlets, posters, and bulletins—obtainable free of charge in basic units, and purchasable in further quantities from the National Safety-First Association. Part 2 gives an outline of works safety organization, under which six essentials are defined : (*a*) support of the management ; (*b*) focusing the safety work in one man ; (*c*) safety committees ; (*d*) inspections and investigations ; (*e*) propaganda ; and (*f*) accident records. Part 3 deals with First Aid, and points out that lack of First-Aid treatment, or of adequate treatment, results in an enormous and unnecessary loss of time on account of injuries that were originally trivial, and which need not have stopped anyone working for more time than it would have taken to get First-Aid treatment.

The scheme, which starts this month, can be successful only if it is taken up with vigour and conviction by some person in a position of managerial responsibility generally working through a works committee of which workers and/or their organized trade representatives form a part. The service envisaged will be supplied only to works where the Inspector of Factories is satisfied that these conditions will obtain. Much that is advocated in the booklet is already practised with success in most of the works and factories with which we are acquainted, but the Industry will do well to study the new scheme in order that its proud record of accident prevention may stand the strain of the prevailing dangers.

CAMOUFLAGE CRITICISMS

WHILE it is obviously impossible to render all gas-works invisible, or even unidentifiable, from the air, there can be no question that camouflage can and does play an important part in making it more difficult for raiders to find their targets. A good deal has already been done in this direction in the Gas Industry, and articles contributed to the " JOURNAL " by experts on the subject have helped to indicate how the work should be done. Hitherto, however, there has been a general lack of co-ordination, both in research and execution. First seriously studied and applied in the last War, camouflage, owing to the enormously increased importance of the aerial factor in modern warfare, now presents virtually a new problem. The underlying principles of camouflage are simple and well known, but there is uncertainty and difference of opinion in their application. There are many problems of camouflage still awaiting solution, and there are new ideas which are now being tried for the first time. At such a time any improvement in the organization of the persons engaged in camouflage which will conduce to the advancement of knowledge of it has a special importance, and it is with the object of effecting such improvements that the Select Committee on National Expenditure, in its Fourteenth Report (H.M. Stationery Office, 2d.) has submitted a detailed report on camouflage and offered a series of recommendations.

It is proposed that the four existing departments which are responsible for the design and execution of schemes of camouflage —those serving the Ministry of Home Security, the Air Ministry, the Ministry of Supply, and the War Office—should be concentrated in a single Camouflage Department, with its own research staff, and administered by the Ministry of Home Security. It is inevitable that the development of camouflage methods depends very largely upon day-to-day practice. Great importance therefore attaches to effective liaison between the executive staffs of the various departments. Such liaison exists on a personal basis, and a technical sub-committee has been appointed to co-ordinate the work of the departments. It is felt, however, that these methods, sufficient though they may be in ordinary circumstances, are too uncertain and too slow in a matter of such urgent importance, and the Committee is convinced that experience and knowledge can only be rapidly and effectively disseminated among the practitioners of camouflage if they all belong to a single organization with a common headquarters.

The second recommendation is that greater use should be made of the experience and knowledge of the non-Departmental members of the Camouflage Committee than has been made in the past. It appears that some months ago two members of the Advisory Committee on Camouflage who had practical knowledge felt it necessary to resign on the ground that insufficient attention was paid by the Departments to research and to the advice of members of the Committee, and that an offer made by one of them to place without charge at the disposal of the Government the result of the facilities for full-scale research which his firm had developed over a period of years had not been accepted. A new committee has since been formed, composed of persons with expert knowledge of camouflage and of representatives of all the Departments concerned. Advantage is now being taken of the research of the expert referred to, who is a member of the new Committee.

The Committee further recommends that Departments and industrial undertakings of the kind which are required to be camouflaged should, when considering plans for buildings, be under an obligation to consult the proposed new central camouflage organization. The siting and planning of buildings from the point of view of camouflage has never been seriously considered either by the Government Departments responsible for building or by industrial undertakings carrying out building operations, and the report stresses the importance of this aspect of the matter. Small modifications at the planning stage of a building may result in great economies and more efficient camouflage, and where alternative sites are proposed camouflage should be one of the factors considered.

The rate at which vital industrial points are being camouflaged should, in the Committee's view, be accelerated. Owners of industrial undertakings who, though not required by law to camouflage their premises, yet desire to do so, should, it is urged, be encouraged to seek the guidance of the official camouflage organization proposed by the Committee. Cases have been noted where private practitioners have undertaken the camouflage of industrial premises, and some of these attempts have been certainly futile and might be dangerous. Most of these private firms have gone out of existence since the beginning of the war, but the Committee does not regard it as satisfactory that the possibility of such maladroit attempts continuing to be made still exists. In conclusion, the report says that though it is true that each unit, whether it be building, airfield, road, or moving or movable object, must be considered as a unit in relation to its circumstances and the method of camouflage applicable to it, it is equally true that individual schemes for each unit should be correlated, and indeed that all schemes of camouflage should be considered as part of a general picture. Under its recommendations the physical execution of camouflage would remain the responsibility of the several Departments which require camouflage, and be carried out as at present, whether by their works organizations or by contractors.

PUBLIC OPINION

AN analysis of what the consumer thinks of the utilities was made by Mr. E. Roper, a Surveyor of Industry and Business, in a Paper presented at the 32nd Annual Meeting of the Pennsylvania Gas Association. His organization studied and tabulated the reactions of gas and electricity consumers when asked several pertinent questions regarding the service rendered by the two utilities. A complete study in the area of one large gas undertaking—and we hope that this is not a true picture of the American Gas Industry as a whole; indeed, we know it is not —showed some remarkable results. The four services of cooking, water heating, house heating, and refrigeration were taken, and such questions as the following were asked : If the costs of appliances were exactly the same, and the costs of the services were exactly the same, how would you like to cook—by coal, oil, gas, or electricity ? Again, How do you think most people will be cooking 10 years from now ? It was found that in that particular area 2.1% of the people use electricity for cooking, 93.5% use gas, 2.1% use coal, and 1.3% use oil. In answer to the question, How would you like to cook ? the figure for electricity goes up, gas goes down, though it stays at 62%. But in answer to the question, How do you think most people will be cooking 10 years from now ? electricity jumps from 25% to 56%, twice as many people believing that it will be generally used as would like to have it. Gas goes down to 25%—or less than half as many people as would like to have it if the cost of the services were identical.

To our mind the important point about the results of this study is that in every instance there are more people who would like to use gas for the four services of cooking, water heating, house heating, and refrigeration than there are who believe that gas will be used 10 years from now. And concerning the virtues of electricity, in almost every instance the answer was, Well, it is the coming thing. The conclusion drawn by Mr. Roper, and from the replies to the questions asked in that particular area it seems to be a reasonable one, is that in gas there is a commodity which the public has judged quite highly, but that exploitation of the commodity has not been such as to make the public believe that it will progress with the years. All the time they have at the back of their minds : Electricity is the coming thing. Though one cannot draw a general conclusion regarding the Industry as a whole from one particular case, at the same time the results of the study to which we have referred indicate in no uncertain way the need for constantly impressing on the public the essential modernity of gas. And this holds good equally in this country as in the States.

Science and Food

" Only a scientist can answer such questions as : For how many hours and under what conditions may a tin of sardines be kept after opening ? What is the ' life ' of a meat pie in summer, and what in winter ? What are the best conditions for the preparation and keeping hot of boiled cabbage ? " So said Dr. L. H. Lampitt, Chief Chemist to Messrs. J. Lyons & Co., Ltd., in the course of a series of Cantor Lectures given to the Royal Society of Arts and reproduced in the Society's *Journal* for November ; and indeed the whole subject of

gastronomics has in recent years become a vast field for research. Not so long ago all that was expected of food was that it should be palatable and wholesome and very little was known about the science which has been developedto such an extent to-day. Experience—and often bitter experience—showed that a tin of sardines could not be kept open long, but food production, its treatment, storage and service have only comparatively recently received the attention which is merited by such an all important subject. This series of lectures reveals how fascinating can be the study of food, and, above all, of what tremendous benefit to the community is research into the subject. Now when we are at war, more than ever before, is it realized of what paramount importance is a complete knowledge of food, its alternatives and substitutes, together with the whole art of preparation and cooking which it involves. This is where the Gas Industry plays a vital part in helping to maintain at a high level the health of the nation. It may well be proud of the immense benefit which has accrued from the investigation and research which it has contributed towards the ultimate aim of a better understanding of food and its cooking. The work of the scientist, the preparation of wholesome food by the manufacturer, the shopkeeper's hygienic storage and distribution of food, would be of little avail if the cooking of it had not likewise been studied and developed until it has become an art. Scarcely a week passes without our reporting the various activities of one or another gas undertaking in support of the National Food Education Campaign, and it is to be hoped that in this direction, as well as in others, full advantage is being taken of this long-standing research into the science and cooking of food which the Industry is ready to place at the service of the Nation.

Copies of the A.G.A. Handbook

In our issue of Sept. 25 we published, over the signature " T. A. T." an exhaustive review of " Fuel-Flue Gases "—the first in the series which is to constitute the new edition of the American Gas Engineers' and the American Gas Chemists' Handbooks. Incidentally, the reviewer took the opportunity of discussing the proposal, which was taking definite shape before the outbreak of war, that a British textbook of gas manufacture should be produced under the aegis of The Institution of Gas Engineers. His thoughts on this subject decidedly invited comment, and we are disappointed that none was forthcoming. But doubtless most gas engineers in these days are fully occupied with matters more urgent than " Letters to the Editor " on academic subjects.

We are pleased, however, to be able to announce that the American Gas Association are anxious to give their British colleagues every opportunity of acquiring " Fuel-Flue Gases," which " T. A. T." reviewed so favourably, and they have asked the " JOURNAL " to handle its distribution in this country. This will answer various enquiries which we have already received. Moreover, the A.G.A. generously offer to extend their member price to purchasers on this side, which means half-price or $2.50. We must point out, however, that this would be the net figure, and no doubt we should be involved in expenses for carriage, duty, &c., which would have to be added.

It will, however, give would-be purchasers an approximate idea of the cost, and we should be pleased to accept orders on this basis. When we know roughly what the requirements will be, we will make every endeavour to obtain copies as rapidly as possible, but we must point out that in these days such transactions are beset with many complications, not the least of which is the remittance of cash overseas.

Directory Returns Please!

Much as we dislike troubling people in these days, we would remind a few undertakings that we have not yet received their particulars for the " GAS JOURNAL " Directory, 1941. We stated that we should not send out individual reminders this year—as a paper economy ; and we are sticking to this rule. The response to our appeal has been excellent, but not quite one hundred per cent. Will those who have not yet sent in a return please help us promptly. Time is getting short.

Incidentally, those who have expressed anxiety concerning what figures may, and what may not, be published need have no worries. We have received a cut-and-dried ruling on the matter, putting it entirely beyond doubt.

The Sight of a Nottingham Corporation Bus towing its own miniature gas-works on the Arnold route on Thursy excited curiosity. An official test with an Enness-Sentinel gas producer on a trailer attached to a standard double-deck bus was in progress. It formed part of the Corporation Transport Department's experimental efforts to adapt an alternative fuel to supplement its petrol allowance. On the nine-mile run the test bus consumed only two pints of petrol—1.6 gall. less than on an ordinary all-petrol journey. Petrol was used for starting and on the bigger inclines. A full day's running on the route on this basis, a bus would consume only about 8½ gall. of petrol, against 34 gall. normally required. It is estimated that the alternative fuel costs less than half that of petrol.

§§

Personal

In the " JOURNAL " of July 31 we announced that Mr. P. E. BROWNE had relinquished the office of General Manager, and, in addition to being elected to the Board of Directors, was also appointed Managing Director. A number of the members of the staff and others in the service of the Company thought that this was an occasion which could be used to indicate to Mr. Browne the high esteem and regard in which he is held, and the idea was enthusiastically taken up.

On Friday, Sept. 13, the basement air raid shelter at Middle Street was packed with about 250 employees of the Company from all areas and sections, gathered together for a much more pleasant purpose than that of " taking cover." They had the temerity to reverse the usual procedure—they sent for the Managing Director, and he came too !

Mr. A. A. Yeomanson recalled that Mr. Browne had first joined the Company some thirty years ago for the purpose of giving the wheel of progress a " mighty shove," had done so, and had witnessed a great expansion of the Company's activities. He asked Mr. Browne formally to accept a gold wrist watch and a gold mounted fountain pen from people who were very happy under his direction.

Mr. Browne expressed his appreciation of the loyalty to him of all employees and looked forward to a continuation of that very desirable state of affairs.

* * *

Mr. A. W. ELLIOTT, Assistant Engineer and Manager to the Stockport Corporation Gas Department, has been appointed to a similar position with the Stretford and District Gas Board. The Stockport Gas Committee, on the recommendation of the Engineer and Manager, have decided to promote Mr. J. HOLLAND, Chief Draughtsman, to the position of Assistant Engineer and Manager. The staff of the Stockport Gas Department made a presentation to Mr. Elliott to mark his departure to his new appointment.

* * *

Mr. WILLIAM WATTS, a Director of the Crieff Gas Light Company, has been appointed Provost of Crieff, Perthshire.

* * *

Councillor A. E. HEWITT, J.P., who has been Chairman of the Gas Committee of the City of Stoke-on-Trent for the past five years, was installed Lord Mayor of the City on Nov. 9. Mr. Hewitt is a Director of W. T. Copeland & Sons, Ltd., the well-known manufacturers of Spode China.

* * *

The many friends of Mr. J. WINSON SCOTT will be sorry to hear that he has met with an accident due to the blackout, and has dislocated his right shoulder and sprained his left arm. We are, however, pleased to learn that he is making good progress towards recovery.

* * *

The new Mayor of Blackburn (Mr. WALTER TEMPEST) has been appointed Chairman and Councillor F. HARGREAVES Vice-Chairman of Blackburn Gas and Electricity Joint Sales Committee.

Obituary

As we go to press we learn with regret that Mr. C. VALON BENNETT died of heart failure at Rochester shortly before midnight on Monday, Nov. 18. The funeral will be held at St. Margaret's, Maidstone Road, Rochester, at noon on Friday, Nov. 22. No flowers, by his request, but donations may be sent to the Benevolent Fund of The Institution of Gas Engineers.

* * *

Mr. WILLIAM FRANCIS WITHAM, for a number of years Chairman of the Burnley Gas Committee, has died at the age of 71.

* * *

The death has occurred of Mr. WILFRED CHARLES BARRY, Sales Manager of the Wisbech Lighting Company, aged 51. Mr. Barry started his career with the Kettering Gas Company. After ten years he joined the Aldershot Gas, Water, and District Lighting Company. After serving abroad in the last war, he entered the service of the Wisbech Lighting Company in 1922 as Chief Clerk and Cashier.

* * *

The death has taken place of Mr. CHARLES WILLIAM WADE, J.P., of Littlethorpe, Yorkshire, who was Chairman of the Pudsey Gas Company. He was 71 years old.

* * *

Mr. EDWARD HOLMES, for 15 years a Director of the Bentham Gas Company, has died at the age of 59.

Forthcoming Engagements

Dec.

9.—**I.G.E.**—Finance Committee, 1.45 p.m. ; Membership Committee, 2.15 p.m. ; General Purposes Committee, 3 p.m.
10.—**I.G.E.**—Council, 10 a.m.
13.—**I.G.E.**—Liquor Effluents and Ammonia Committee, 12.15 p.m.
13.—**Gas Research Board.**—Joint Research Committee, 2 p.m.
17.—**I.G.E.**—Gas Education Executive Committee, 2 p.m.
19.—**Gas Research Board.**—Refractory Materials Joint Committee, 2 p.m.

Technical Methods of Chemical Analysis*

The first three volumes of the present edition of this classical treatise appeared in 1924, 1928 and 1931 respectively. After an interval of nine years the fourth volume has now been published. It is devoted to technical chemical analysis in the industries concerned with coal gas, ammoniacal liquor and ammonium salts, coal tar and tar products, calcium carbide and acetylene, explosives, matches and fireworks and textiles and textile chemistry.

The corresponding volume of the previous edition dates back as far as 1911 and the intervening period has been particularly fruitful as regards the development of technique for the analysis of tar and tar products, a subject which occupies a large proportion of the new volume and extends over 371 pages. In this connexion it may be mentioned that the first English edition was merely a translation of Lunge's German text, adapted to English conditions of manufacture. In the new edition a complete break with tradition has been made, the chapter having been virtually rewritten. It was, indeed, necessary that this should have been the case since the analysis of tar and tar products has been revolutionized by the work of the Standardization of Tar Products Tests Committee which culminated in the publication, in 1929, of "Standard Methods for Testing Tar and its Products," a new edition of which was published in 1938. In the writing of the chapter devoted to these materials there has been a very happy collaboration between Mr. R. Murdin Drake, the S.T.P.T.C. Secretary, and Mr. A. McCulloch, with the result that it has been possible to include large extracts from "Standard Methods." These are interspersed with a valuable running commentary on the importance and significance of the various tests, much information on the composition of the raw materials and the commercial products made from them, and summaries of the standard specifications in force in this country and elsewhere. However, and of set purpose, the extracts are not sufficiently detailed, in all cases, to render it unnecessary for the analyst to possess a copy of "Standard Methods." The information given about raw materials is, to some extent, not quite applicable to the products obtained under the present-day conditions of carbonization at really high temperatures. This is, however, the only exception which can be taken to what must be regarded as one of the best chapters in the whole treatise.

The chapter devoted to coal gas is contributed by Mr. H. D. Greenwood, and is concerned with the analysis of raw materials (coal, gas oil, refractory materials and iron oxide), the carbonization of coal and its control, the analytical technique employed in the control of the purification of gas from tar, ammonia, sulphuretted hydrogen, cyanogen, naphthalene and organic sulphur, and the examination of coal gas and coke. The lengthy section in the previous edition devoted to the illuminating power of gas has disappeared since this aspect has been rendered obsolete by the adoption of the therm system. To compensate for this, the chapter now contains much information on matters which have more recently come into prominence. Gum formation does not, however, receive consideration and the references to organic sulphur and its removal could, with advantage, have been more detailed. The analysis of coal and coke is described in Vol. I of the treatise and the information given in the present volume must be considered as being merely of a supplementary nature. In the meantime, however, several British Standard Specifications covering the testing of solid fuels have been issued and references to some of them and to various Fuel Research Technical Papers are made. In most cases full details are not given and this is to be regretted, since the older methods have been universally superseded by the standard methods.

Mr. Greenwood has collaborated with Mr. P. Parrish in the short but useful chapter (20 pages) on ammoniacal liquor and ammonium salts.

The chapter on calcium carbide and acetylene by Mr. C. Coulson-Smith is adequate and includes extracts from the appropriate British Standard Specification.

Prof. J. Reilly contributes two chapters covering respectively explosives and matches and fireworks. They contain a very full *résumé* of the testing technique employed for a wide range of products. In general, the methods are of long standing and but little new information is given.

The chapter on textiles and textile chemistry (283 pages) has been prepared by Mr. J. H. Preston with the aid of a number of collaborators, and is replete with up-to-date information. It includes the physical and chemical tests of textile fibres and fabrics; the tests for dyestuffs used on textiles and for the auxiliaries and detergents employed in their treatment ; and tests for finishes and their defects.

It will be noticed that the cost of the volume is £4 4s. in comparison with £3 3s. for the earlier volumes. This does not, however, represent a wartime advance in price, but is due to the much larger number of pages—namely, nearly 1,000 as against an average of about 750. Nevertheless, its cost will render the book beyond the reach of many potential purchasers. The publishers would be performing a good service, a further incentive towards which should be the present need for economy in paper, if the chapters devoted to gas, liquor, purification and tar and tar products were made available as a separate volume, which, incidentally, would extend to more than 400 pages. The subjects included in the new volume cover so diverse a range that the number of analysts likely to be actively interested in all of them must be comparatively small. On the other hand, libraries, University laboratories, consulting analysts and many large organizations will need the complete volume, though, even in their case, the division of the subject matter into two sections would be advantageous.

"Technical Methods of Chemical Analysis" is well indexed and one feature of the author index is specially to be commended—namely, the indication given of the particular piece of information concerned in each reference. This enables a given author's work on the subject of momentary interest to be traced immediately, whereas, in absence of this feature, the several pages on which his name appears might have to be consulted before the right one was found.

* Lunge and Keane's "Technical Methods of Chemical Analysis." Edited by C. A. Keane and P. C. L. Thorne. Second Edition. Volume VI. [London and Edinburgh, 1940. Gurney & Jackson. Pp. xvi + 963. Price £4 4s. net.]

GAS TRACTION DEVELOPMENT COMMITTEE

INTERIM REPORT

THE Gas Traction Development Committee was formed in October, 1939, with the following terms of reference : "To investigate the sources and supplies of gaseous fuels in Great Britain and to make the information available in such a form that these gaseous fuels can be exploited in war and in peace thereafter."

The Committee consists of Messrs. J. Arthur Greene, G. M. Glass, J. Alsop, S. G. Watson, H. V. Senior, C. Ridley, J. Orme, E. H. Cunningham Craig. The Secretary is Mr. C. Ridley.

Having regard to the present situation, and that which will follow the termination of hostilities, it is generally recognized that we must utilize our indigenous resources to the last degree. As the war develops it is evident that greater demands will be made upon petroleum supplies, which have to be imported from abroad, so that any fuel substitute which can be made available in this country, and which will help to reduce the consumption of sea-borne oil, ought, in the opinion of the Committee, to be investigated with a view to its immediate development. The work undertaken by the Committee divides itself into two parts : (1) Resources available, (2) the manner in which such resources can be utilized. It should be noted that this is an interim, or progress, report, and it is in no sense intended to be final, nor is its object to suggest that any one form of gaseous fuel is necessarily superior to another ; the object is to present the evidence which has so far been obtained, and to establish a starting point for more extended work and practical development.

Methane

While this report deals very largely with methane this gas is not by any means the only form of indigenous gaseous fuel which is, or can be rendered, available for use in internal combustion engines. Large quantities are, however, immediately accessible, and of which, up to the present time, no use had been made. In internal combustion engines it gives greater efficiency than petrol, and there are no greater technical difficulties than in the case of coal gas or its derivatives. In any event the Committee decided that it was desirable to concentrate upon one problem at a time, and to consider the possibilities of other forms of gaseous and liquid fuels which can be obtained from indigenous sources if it is decided to continue the investigations.

The supplies of methane are much greater than has hitherto been assumed. It has been believed that sewage works, using digester plant, is the only readily available source of this gas, but our investigations show that, although this direction is capable of immense development, it is, at the present, the least important of the individual sources. The quantitive resources may be tabled as follows : (1) Coal mines, (2) coke ovens, (3) natural gas, (4) sewage works. No investigation has been made into the very large quantities of spirit which may be rendered available by agricultural development, and which has already been reported upon by a Government Committee.

The quantity of methane which is available in our coal mines is variable. A few collieries have "blowers," from which there is an issue of upwards of 500,000 cu.ft. of very pure gas per day. The analysis of the gas at one of these collieries is :

Colliery Fire-Damp

Methane	98.04%
Carbon dioxide	0.95%
Oxygen	0.10%
Nitrogen	0.90%
Carbon monoxide	0.0015%

The colliery from which the above gas analysis is made has an issue of upwards of 500,000 cu.ft. per day. Several collieries have issue exceeding 250,000 cu.ft. per day. It is estimated that of our operating collieries more than 500 have an average ventilation of 100,000 cu.ft. per min., containing 0.25% CH_4.

In one year a group of five collieries in South Wales discharged nearly 1,000 million cu.ft. of gas. By converting this by compression

to its equivalent in petrol, it equals approximately 7 million gallons. Consideration of the general technique of bringing the gas to the surface is of paramount importance and is at present the subject of investigation. Although some collieries can raise the gas to the surface with no difficulty, at the majority, where it is at present diluted and blown to waste, there are engineering problems with which to contend, but these do not present insurmountable difficulties with due regard to the safety of the mines. When it is shown that the gas has a commercial value, and its use is of national benefit, it is believed that a general technique will be devised and adopted.

Coke Ovens

There are more than 1,000 coke oven installations in operation. The quantity of CH_4 available from this source, and at present wasted, is estimated at 10 million cu.ft. per day. The composition of the gas yield varies considerably, but the following analysis is of interest :

Coke Oven Gas

Methane	31.85%
Hydrogen	53.90%
Illuminants	3.04%
Carbon monoxide	6.72%
Nitrogen	2.34%
Oxygen	0.27%
Carbon dioxide	1.88%

Very large supplies of natural gas are available in this country. The drilling at Dalkeith, near Edinburgh, has a yield of upwards of 2 million cu.ft. per day, and from the general geological conditions it is considered probable that this will be maintained for many years to come. Indications of the pressure of similar gas in several other localities have been observed, and sites for drilling mapped. Samples of the gas have been secured from various sources, and the following may be accepted as an average analysis :

Methane	80.5%
Ethane	19.5%
Hydrogen	1.3%
Oxygen	0.2%
Carbon dioxide	0.1%
Carbon monoxide	*Nil*
Sulphuretted hydrogen	*Nil*

Sp. gr. (60° F.) 0.6575. Calorific value, 1,140 B.Th.U. per cu.ft.

Sewage Works

There are at present four sewage works in the London area now producing methane, the aggregate quantity being 2 million cu.ft. per day. The analysis of the gas is :

Sewage Sludge Gas

Washed.		*Unwashed.*	
Methane	95%	Methane	66 to 69%
Carbon dioxide	4%	Carbon dioxide	30 to 33%
Other mixed gases	1%	Other mixed gases	1%

Of the amount produced, the greater portion is used direct under stationary engines, the remainder being surplus and wasted. Five other sewage works have digester plant installed, and eight others had decided upon its introduction at the outbreak of war. The quantities of gas which can be produced have not been estimated, but the amount at present utilized as a substitute for petrol or diesel oil, by the four existing works alone, is not insignificant. At the Mogden works there is an available surplus of 150,000 cu.ft. of methane per day, or the equivalent of 700 gallons of petrol. Arrangements are being made to dispose of this locally in compressed form. If a price of 2s. per petrol gallon equivalent is realized, this would amount to £25,000 per annum.

Figures relating to daily production at the outbreak of war are given as follows :

Sewage Works. Volume of Gas

	Produced.	*Used.*	*Surplus.*
Mogden	1,350,000	1,100,000	250,000
Croydon	300,000	—	300,000
Dagenham	90,000	10,000	80,000
Sutton	70,000	20,000	50,000

The utilization of the gas introduces economic considerations of importance. As is shown, it can be, and is, utilized " as it comes " with its impurities of other gases, uncompressed and in stationary engines direct. At one of the sewage works it has been so used with full efficiency for three years and without any deleterious effect on the engines. The direct saving in fuel costs is apparent as the cost of piping the gas is trivial. This practice is now in vogue at Mogden, Dagenham and Sutton. The Committee is satisfied that the use of methane, where it is available *in situ*, for motive power introduces great economies in fuel consumption and fully justifies the installation of equipment for this purpose. The problem arising if the fuel cannot be used at point of origin and has to be transported either to stationary engines or to provide the motive power for vehicles, is of a different character. The gas can be supplied (*a*) direct to the vehicle into a balloon affixed to the roof, (*b*) it can be compressed into cylinders. It has not been found that methane has ever been used to fill balloons for vehicles or otherwise. Coal gas is used for this purpose, but not efficiently to any great extent. The system has many disadvantages. Balloons are clumsy and increase the height of the vehicle ; a lighted cigarette or match might bring about disastrous results. On account of its size a balloon holding more than the equivalent of two gallons of petrol is impracticable. The cost of the balloon equipment was, pre-war, about £25. Wear and tear are considerable.

It is possible to convey large quantities of compressed gas in cylinders in relatively small volume. The gas compressed will give approximately 140% to the gallon petrol equivalent. The following is the costing of a scheme to use a 98% pure methane at a colliery. The figures are calculated on pre-war prices. The scheme is intended to deal with 250,000 cu.ft. per day, and is calculated on the basis of 320 days per year.

Expenditure

(A) Three sets motor-driven 100 cu.ft. per minute compressors complete and erected on foundations	7,000
(B) Three pairs 19 cu.ft. water capacity storage accumulators having free gas capacity of 6,300 cu.ft. each at 5,000 lb. complete and installed	1,800
(C) Compressing station, buildings, &c.	1,000
(D) Contingencies, say 10%	980
	£10,780

Costs

Annual Charges

Interest at 5% on A, B, C, and D	£539

Operating Costs

	£
Power charges 750,000 K.W. hours, at, say, 0.4d. per unit	1,250

Labour Charges

1 foreman (£400 per annum), 6 men (each, say, £200 per annum)	1,600
Oil waste .stores, cooling water, &c.	250
	£3,100

For the purpose of illustration assume the plant at a life of three years, and the throughput of gas compressed 20% less than full capacity :

250,000 × 320 × 3	240,000,000 cu.ft.
Less 20%	192,000,000 cu.ft.
at 140 cu.ft. per equivalent gallon petrol	1,371,400 gallons

Total Costs

	£
Capital	10,780
Interest, 3 years at 5% on £10,780	1,617
Operating costs, 3 years	9,300
	£21,697

This equals 3.8d. per gallon petrol equivalent.

Income

1,371,400 gallons at 1s. 6d.	102,855
Less total costs	21,697
Balance	£81,158

NOTE.—*Variation in prices of 3d. per gallon on petrol is equivalent of* £17,000 *(approximately).*

These figures do not include the sum payable to the colliery for the gas, which is a matter for mutual arrangement, and are based on the price of the gas ex-storage accumulators at works.

Containers for Vehicles

The provision of containers for the use of the gas on vehicles is a matter of arrangement as between the works and the consumer, but if 1d. per gallon is added to the sale price of the gas, and the cylinders are filled once per day, the cost would be covered in a little over a year ; as, however, the minimum working life of a cylinder is calculated to be six years, the amount to be added per gallon equivalent would be only a fraction of a penny.

The foregoing estimates relate to the utilization of a gas containing 98% methane ; if it is proposed to deal with a sludge gas it is necessary to wash out the carbon dioxide. The scrubber plant required for this purpose is of the type in general use, and its cost would increase the above figures by :

Capital Charges

	£
Washing plant erected	965
Foundations	250
Contingencies, 10%	121
Interest, 5% on £1,336 for 3 years	200
Labour, 1 extra man per shift for 3 years	600
	£2,136

Equals 0.38d. per petrol gallon equivalent.

Liquefaction

There are no technical difficulties in the actual process of liquefaction. Of recent years considerable progress has been made in this direction in other parts of the world and many mechanical improvements have been devised, especially in relation to the separation and recovery of methane from mixed gases of the coke oven type. None of these systems has been effectively demonstrated in this country up to the present. The utilization of methane in liquid form is the most desirable method of application. The Committee has been informed that, in modern practice, the cost of liquefaction is less than 3d. per gallon ; it has been established that 100 cu.ft. of the gas are required to produce one gallon of liquid. There is also to be demonstrated the efficiency of suitable containers for low temperature liquid of this character in order to prevent evaporation. The ordinary petrol tank lagged with some suitable substance is stated to be quite satisfactory, but we have not yet been able to establish the claims put forward by inventors and others.

Conclusions

(1) The Committee is satisfied that very large quantities of methane exist in this country.

(2) A substantial proportion now goes to waste and is immediately available for use and much greater quantities can readily be rendered available.

(3) Its satisfactory and economical use in stationary engines has been fully established.

(4) It can be piped from place of origin to adjacent internal combustion plants ; or it can be compressed and transported.

(5) If there is a considerable percentage of CO_2, as in the case of sewage sludge gas, this can be removed by washing ; for mixtures of the coke oven type, systems of refrigeration are available.

(6) Compressed it is suitable for use in any type of motor-driven vehicle, but preferably of the commercial class operating in a limited mileage of site of production.

(7) Liquefaction presents the most attractive form of use, but the efficiency of containers is yet to be demonstrated in this country.

(8) It provides an extremely cheap source of power.

National Gas Council

Meeting of Central Executive Board

A meeting of the Central Executive Board was held in the Provinces on Nov. 12. The Chair was taken by Sir DAVID MILNE-WATSON, Bart., LL.D., D.L.

Coal.—The Coal question as affecting the Gas Industry was discussed under the following headings :

(*a*) Coal Supplies.
(*b*) Price of Coal.
(*c*) Demurrage.

Appropriate action was agreed in connexion with all these subjects.

Supplies of Gas to the Admiralty and War Office.—The question of supplies of gas to the Admiralty and the War Office was considered, and the Officers were instructed to take energetic measures to investigate the position.

Priority for Steel and Other Raw Materials.—The Board discussed the present unsatisfactory position, and the steps taken to deal with the matter were approved.

Federation of British Industries.—The following representatives were appointed to serve on the Grand Council of the Federation of British Industries :

(*a*) *Main Group* 9, *Section* 1 (*Chemical Fertilizers and Explosives*) :
Mr. E. V. Evans.
Mr. Gordon Adam.

(b) *Main Group* 14, *Sub-Group* 3 (*Public Utilities*) :
Mr. H. C. Smith.
Mr. John Terrace.
Mr. S. S. Ogilvie.

Date of Next Meeting.—It was decided that the next meeting of the Board should be held on Jan. 14, 1941.

At Pick-up Points on the town's main bus routes the Warrington Gas Department are to instal 115 " starlights."

Loans from Local Firms towards Plymouth's £1,000,000 War Weapons Week effort, which ended on Saturday, Nov. 16, included £5,000 from the Plymouth and Stonehouse Gas Company.

In the Government's Latest Canteen on the Lancashire coast a gas kitchen has been installed by the Thornton Cleveleys Gas Department.

Middleton's New Elementary School opened this month is centrally heated by gas, and in the staff and domestic science rooms three " New World " cookers have been provided.

Operations are Now Proceeding with the removal of the street gas lamp-posts in Dunbar and district, and these are to be disposed of in order to aid the national appeal for metal.

The Airdrie Town Council have agreed that men displaced from the Gas Department by the re-organization of staff be given employment, wherever possible, in other departments.

With a View to Extending " starlight " street lighting in the burgh, the Airdrie Corporation Gas and Lighting Committee have recommended the purchase of an additional 200 fittings.

The Centenary of the Workington Gas Undertaking has been celebrated by the inauguration of a supply of gas to the district of the Ennerdale Rural Council, 15 miles away.

March (Cambs.) Urban Council, at their monthly meeting on Nov. 4, carefully considered a suggestion that last winter's emergency street lighting system should again be brought into use this winter. There were lengthy discussions on the subject, and eventually it was decided to obtain the opinion of the Ministry of Home Security.

At the Request of the Otley and District Food Control Committee, the Otley Gas Company have organized a series of six wartime Cookery Demonstrations, which are to be held on Thursday afternoons. The first of these took place on Nov. 7, under the Chairmanship of Councillor Mrs. M. Johnson, J.P., when about 117 were present. The Demonstrator is Miss I. W. Sketchley, M.C.A., who is a member of the Home Service Staff of the United Kingdom Gas Corporation, Ltd. Food Ministry films are being shown before the demonstration takes place.

Bulk Supply to Ennerdale

Inauguration Marks Workington Centenary

SIX years under negotiation, the scheme for the supply of gas in bulk from Workington to the Ennerdale Rural District Council culminated this month at the Gas-Works, Stanley Street, when the Mayor, Councillor Sam Walker, sent the first gas through the pipes on its 1½ hours' journey. The three Gas Undertakings of the Ennerdale Council have now ceased manufacture. They are Cleator Moor, Egremont, and Frizington.

At the conclusion of the ceremony the company was conducted round the gas-works by Mr. Hedley Hoy (Engineer and Manager).

The Contractors responsible for the various parts of the scheme were as follows : Gasholder, Drummond & Co., Workington ; pressure and volumetric governors, turbine driven boosting plant and steam driven gas compressors, the Bryan Donkin Company, Ltd., Chesterfield ; gas meters, W. C. Holmes & Co., Ltd., Huddersfield ; carburetted water gas plant, Humphreys & Glasgow, Ltd., London.

At the conclusion of the tour, the company adjourned to the Commercial Hotel for luncheon. In the chair was Mr. W. A. Walker, Chairman of the Gas Committee.

Proposing the toast, " The Ennerdale Council and its Gas Undertaking," the Mayor revealed that the inauguration of the scheme for the bulk distribution of gas to that area had fallen during the centenary year of the Workington gas supply. It was in 1840 that a Company was first formed within the borough for the manufacture and distribution of gas ; seven years later it was purchased by the local Board. At the outset the scheme was formulated for the supply of coke oven gas to the gas undertakings of all West Cumberland, if necessary. Mr. George Evetts, Consulting Engineer, was engaged to submit a report, and this was completed in July, 1935. Many meetings of representatives of the different authorities took place, but in the end, Ennerdale alone agreed to go forward with the scheme which he had had the pleasure of inaugurating. On behalf of the Corporation of Workington, he wished all possible success to the enterprise.

Replying to the toast, Councillor J. Robley, Chairman of Ennerdale Rural District Council, said that after long negotiations they had now finally completed their design. Ennerdale, he knew, was indeed grateful for the way in which they had been helped by Workington.

Councillor McHenry expressed thanks to the United Steel Companies, the Consulting Engineer, and the Contractors.

The toast, " Technicians and Workmen," was proposed by the Chairman. Replying, Mr. Hoy said the scheme was a tribute to co-operation. However, he wished to make reference to his Deputy, Mr. Pope, who worked tirelessly, unceasingly, and ungrudgingly during the progress of the scheme. The work of the Contractors had been good, right from the start.

Mr. W. T. Drummond replied on behalf of the various contractors.

B.S. Specifications

The following recently-issued British Standard Specifications can be obtained, at the price stated against each one, from the Secretary, The Institution of Gas Engineers, 1, Grosvenor Place, London, S.W. 1. : No. 436–1940. Machine Cut Gears. (A.) Helical and Straight Spur (Superceding No. 436–1932), price 7s. 10d. each ; No. 789A–1940, War Emergency British Standard for Steel Tubes and Tubulars Light Weight and Heavy Weight Qualities, price 2s. 3d. each ; Nos. 925, 926–1940 War Emergency British Standard for Oils, Thinners, Driers, and Extenders (including review of and modifications to existing standards)—No. 925, Oil for Paints (Linseed Oil Base) ; No. 926, Additional Extenders for Paints, price 2s. 3d. each ; Nos. 927, 928–1940, War Emergency British Standard for Pigments : White, Black, and Coloured (including review of and modifications to existing standards—No. 927, Alternatives for Lead and Zinc Chromes ; No. 928, Alternatives for Brunswick or Chrome Greens and Green Oxides of Chromium, price 2s. 3d. each ; No. 929–1940, War Emergency British Standard for Ready Mixed Paints, Priming Paint, Undercoating Paints, Finishing Coat Paints, Oil Gloss, price 2s. 3d. each.

COLOUR VARIATIONS OF BAKED FOOD PRODUCTS

In the "JOURNAL" of Nov. 6 we referred to the publication by the American Gas Association of Bulletin No. 8 on Domestic Gas Cooker Research. We called attention to a new method of evaluating baking qualities. The following is an extract from the Bulletin on this aspect.

SINCE the primary purpose of an oven is to bake, roast, or cook thoroughly and evenly, uniform distribution of heat is one of the most important problems confronting range designers. The difficulty of evaluating the many variables influencing heat distribution and determining effect of each one contributes to the complexity of this problem. Heat is introduced into an oven by conduction, radiation, and convection, and the amount of total heat transferred to the food being baked by radiation, for example, may be quite different when the oven is fully loaded than when it is only partially loaded.

A number of the more important factors affecting heat distribution are known and may be varied by experienced designers with favourable influence on heat distribution. This is known as " balancing " an oven. Probably the most important effect on uniform baking is that of thermostat accuracy and responsiveness, and location of the thermal element. After the oven has been thoroughly preheated, the door is usually opened to introduce materials to be baked, during which time average oven temperature temporarily decreases. Thermostats must be fast-acting and properly located so as to bring the temperature back to the required level after the oven door is closed without too great an overshoot.

Quantity of heat stored in the walls of the oven also has an appreciable effect on temperature drop and subsequent overshoot with its corresponding effect on uniformity of baking. Although a large quantity of stored heat due to increased mass of an oven is undesirable from the standpoint of preheating speed and fuel economy, it favourably affects heat distribution by stabilizing variations in oven temperature when doors are opened and cold substances are introduced. Direction and speed of the flue products entering an oven have an effect on heat distribution and may be governed by symmetrical placement of the flue inlet openings and careful choice of the flue outlet position. Heat near the oven bottom may be balanced by controlling the direct heat conduction through the oven bottom by means of heat baffles, insulation, shape, or thickness of oven bottom.

Test Method for Evaluating Baking Qualities

One deterrent in measuring the effect of different factors in oven design on baking quality has been the lack of a satisfactory device for determining, in simple and accurate terms, colour variations of surfaces of baked products. Standardization of ingredients and method of preparation is also necessary in order to obtain the same baked product under identical conditions.* No satisfactory correlation between oven temperature distribution and oven heat distribution has been possible because two points may have the same temperature, yet have different amounts of heat flowing past them. For example, a thoroughly preheated oven may show uniform temperature distribution when empty, but when cold pans and dough or batter are introduced into the oven they absorb heat, tending to decrease temperature in the immediate vicinity. Moreover, the temperature may be decreased more at one point than at others, if the rate of flow of hot flue gases past this point is less than average, or if nearby parts have less heat capacity and radiate less heat to this cooled point. This same condition may prevail throughout the major portion of the baking cycle, since heat must be supplied continuously to the dough to vaporize the water and complete the baking operation.

It has been indicated in the foregoing that satisfactory " balancing " of an oven must be done by evaluating any changes made in factors affecting heat distribution, in terms of actual baking results. Quality or evenness of baking, as indicated by uniformity of surface browning, is commonly judged by the personal opinion of an experienced observer. It is obvious that this procedure presents a disadvantage because of the human element involved. The likelihood of two persons judging colour identically, or even of one person evaluating samples accurately and consistently, is slight. Because of this apparent inconsistency in test results, it has been impossible to analyse correctly effects of changes in oven design or set up definite numerical limits for acceptability of brownness of baked products. To overcome this discrepancy, a photoelectric reflectometer was developed by the Laboratories to facilitate the problem of accurately rating and permanently recording the quality of baked products.

Since the quantity of light reflected from any surface is a function of its colour, and since measurement of reflective power in terms of per cent. of light reflected is a means commonly employed for comparing shades of colour, this method was adopted at the American Gas Association Testing Laboratories for comparing degrees of brownness. The reflectometer constructed for this purpose was equipped with filters over the photoelectric cells so that reactance to colour was similar to that of the human eye. This instrument is pictured in Fig. 1.

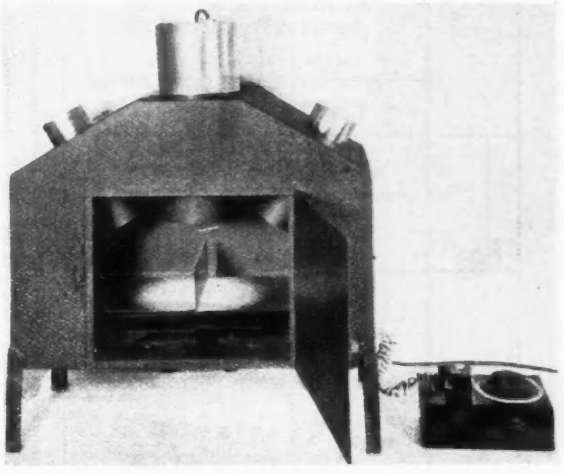


FIG. 1.—*New Photo-electric Reflectometer for Measuring Colour Variations of Baked Food Products.*

A schematic drawing of the cabinet, optical system, and electrical circuit is shown in Fig. 2.*

Pure magnesium carbonate block with an absolute reflectance of 98 to 99% is used as the reflectance standard, and for simple comparisons is considered to have a reflectance of 100%. Light from a common source is projected upon 1 sq.in. of this standard and 1 sq.in. of test specimen (cake or cooky surface). Reflective power of the exposed area of test specimen with reference to that of the standard is measured in terms of percentage reflectance by balancing the circuit of the two photoelectric cells with a calibrated variable resistor and reading the numerical value indicated on the resistance dial. The value of this type of instrument lies in its ease of calibration and operation, extreme accuracy, and relatively low cost.

A series of experiments was conducted in which reflectance readings obtained with the reflectometer were compared with visual colour ratings assigned to cookies by an experienced observer. During early stages of this investigation a rough visual scale was adopted in which a rating of " 1 " represented the light, creamy appearance of raw dough, and a rating of " 10 " represented the purplish-black appearance of a charred product. Ideal colourings were indicated by ratings of " 4," " 5," and " 6." These were various shades of a light, golden brown. Ratings of " 3," " 7," and " 8 " represented cream-coloured, tan, and light chocolate brown surfaces, respectively, and were considered acceptable, but rather critical. Visual ratings obtained according to this method on several successive days were compared with instrument reflectance readings. Although reflectance readings were found to be consistent, visual ratings

* A standard cooky recipe is given in American Standard Approval Requirements or Domestic Gas Ranges.

* Details of construction, calibration, and operation of this equipment are available at the American Gas Association Testing Laboratories in Cleveland.

were subject to change, as indicated by the area included between dotted lines in Fig. 3. The solid line represents an average comparison of units. Curved sections at the ends of this line are due to the fact that essentially absolute reflectance standards were employed rather than the light, creamy colour of raw dough. Curvature is also indicated by failure of the human eye to evaluate colour properly at the ends of the scale where perfect white and black are approached.

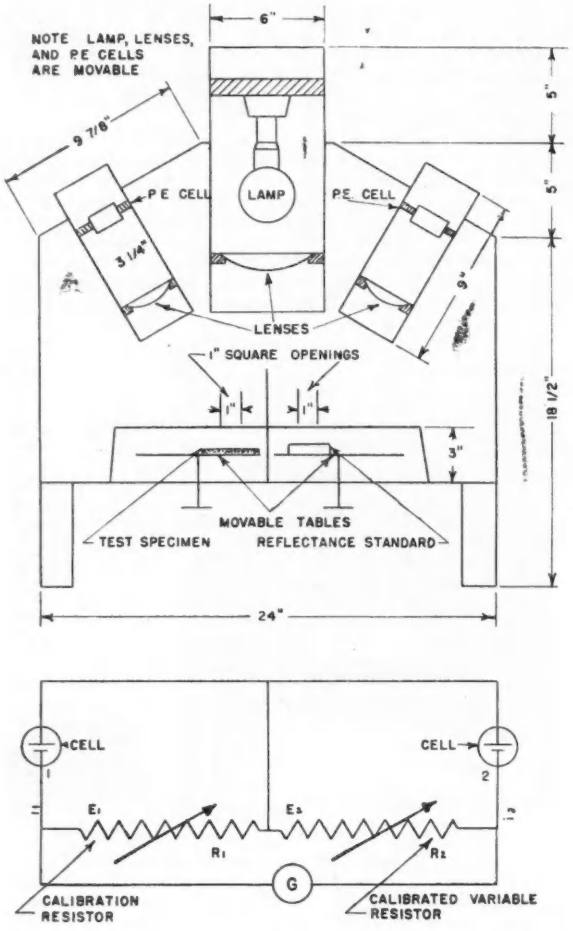


FIG. 2.—*Photoelectric Reflectometer.*

One direct result of the adoption of an accurate colour comparison method was the discovery that, although different temperature levels in an oven affected degree of brownness of a baked product, overall differences between reflectances of lightest and darkest areas were not usually affected. In other words, if cakes were baked in an oven at an average temperature of 350° F. and the difference between reflectance values of the lightest and darkest areas was found to be 20%, approximately the same difference would be found if cakes were baked at 375° F. From the same data it was also found that the general appearance or average colour became darker as temperature levels were increased at the rate of approximately 1% reflectance change per 2° F. increase in temperature.

Although considerable thought has been given to the effect of thoroughness of batter-mixing on reflectance characteristics and texture of baked product, this possible variable has been eliminated by standardization of recipes and specifications covering the use of motor-driven beaters or mixers. Although it would be impractical to devise standard tests for the purpose of satisfying all conditions of batter-mixing to be found in the field, such standardization is necessary for purposes of scientific testing and experimentation, since it serves to eliminate or standardize other variables so that degree and uniformity of browning may be employed as a true indication of oven baking qualities and uniformity of heat distribution.

TABLE 1.—*Minimum Density of Insulation Necessary to Prevent Settling in Different Heights of Vertical Insulating Columns.*

Type of Material	Height of Insulating Column—In.				
	15	20	25	30	35
	Lb/Cu.ft.				
Mineral or Rock Wool (Long Fibre)	8.5	9.0	10.0	10.5	11.0
Mineral or Rock Wool (Medium Fibre Length)	8.0	8.0	8.5	8.5	9.0
Glasswool*	2.5—3.0	2.5—3.0	2.5—3.0	2.5—3.0	2.5—3.0

* Glasswool was the grade commercially available for use on gas appliances.

Settling Characteristics of Insulating Materials

Investigation of settling characteristics of the more common types of insulation materials employed in ranges was conducted for the purpose of obtaining data which would permit reasonable predictions of the minimum densities at which such materials must be packed to prevent or minimize settling. This characteristic is an important one in any evaluation of insulating effectiveness, since obviously, if a density is employed at which settling will occur under normal handling, effectiveness of the material employed will be appreciably impaired. It should also be noted that settling of insulation during shipment is undesirable, since the absence of insulation on the top and upper portion of the appliance sides if detected by the customer may create an unfavourable reaction far out of proportion to the actual effect such settling might have on fuel economy.

Handling of appliances in shipment varies so much that no precise prediction of the exact extent of settling to be expected can be made. However, the results should be useful since they indicate minimum densities which can be used with a reasonable expectation that very little settling will occur.

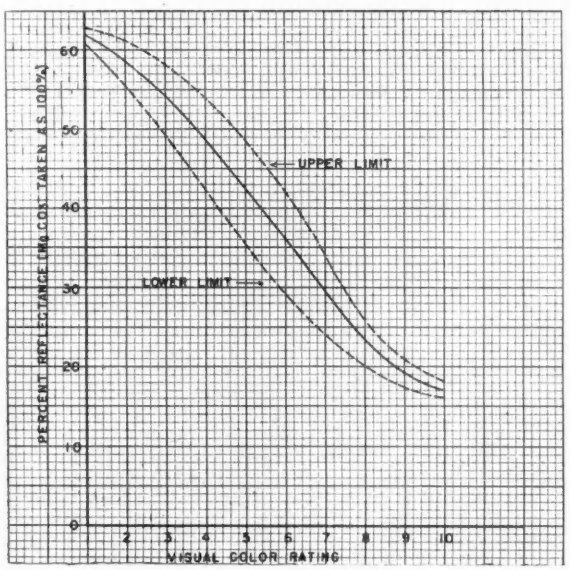


FIG. 3.—*Comparison of Visual Rating to Values of Reflectance as Measured with the Photoelectric Reflectometer.*

Results applicable to ranges are summarized in Table 1. It will be noted that for each of the fibrous wool materials minimum densities required to prevent settling increased slightly as the height of insulation column was increased. It is important to note that these data are applicable to any reasonable thickness of insulation, since similar results were obtained for each material with thicknesses varying from 1 to 3 in., inclusive.

Mr. W. H. Battersby, Gas Engineer and General Manager, welcomed members when the Bury Inner Wheel held their last meeting in the showrooms of the Bury Gas Department. He emphasized the important part being played by the Gas Industry in our war effort, and the programme included popular wartime gas cookery demonstrations.

first!

In War-time or in Peace, there is no argument so unassailable as that in favour of quality in production. The economical running costs of Radiation equipment result from the highest standard of manufacture in the Industry.

Technical and other problems connected with the planning and equipping of Hospital, Hotel and Industrial Canteens and Kitchens are the constant study of the Radiation Large Cooking Equipment Section.

This knowledge and experience, coupled with unrivalled designing and manufacturing facilities, ensure in advance the right practical approach to every project. Many of the most successful Canteens are evidence of this Radiation care and forethought and of their skilled assistance to Gas Undertakings in the carrying out of such work.

The Radiation technical experience and organization are at your service.

Double Oven Gas Ranges

Enclosed Ranges

Roasting and Baking Ovens

High Efficiency Hotplates

Vegetable and Pudding Steamers

Grillers and Salamanders

Toasters, Bains Marie

Carving Tables

Fish Frying Ranges

Milk and Porridge Boilers

Water Heaters, etc.

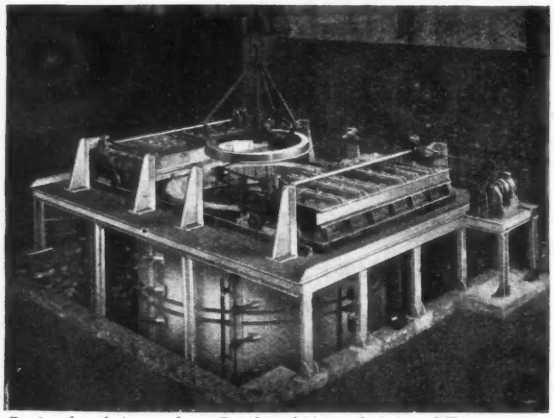
LARGE – SCALE EQUIPMENT

FURNACES FOR THE RAILWAY INDUSTRY

FEW industries employ heat treatment to a greater extent than do the railways, and it is fitting therefore that in its programme of issuing informative brochures for seven or eight of the major industries the Incandescent Heat Co., Ltd., Smethwick, should have chosen " Furnaces for the Railway Industry " as the title of the first of the series. Others are to follow on such subjects as the aircraft, automobile, sheet and tinplate, enamelling, wire and strip, and shipbuilding industries. The manufacture and maintenance of locomotives, carriages, wagons, and permanent way calls for the careful selection of the most effective and economical heat treatment plant, and the information given in the brochure is based on actual experience with plant installed in the workshops of the leading railway construction and maintenance engineers throughout the world, including three of Britain's " Big Four " railway companies, and a number of undertakings in India and Ceylon.

Furnaces have been supplied for all stages of production requiring heat energy, including plate heating, angle and bar heating, section heating, rivet heating, forging and upsetting of connecting rods, piston rods, &c., heat treatment of forgings, heat treatment of springs, carburizing, tool hardening, steel melting, annealing of steel castings, cast iron malleableizing, core drying, chain annealing, tyre heating, tube annealing, white metalling, and the heat treatment and melting of all classes of non-ferrous alloys.

Plate, angle, and section heating equipment is typified by two producer gas-fired recuperative plate heating furnaces, 18 ft. by 11 ft., installed in the boiler shop of one of the British railways. The furnaces are suitable for all temperatures up to 1,200°C., and are equipped with a three-ton capacity electric charging machine. In temperature control, maintenance and production, this installation has given many years' satisfactory service. In another railway company's boiler shop

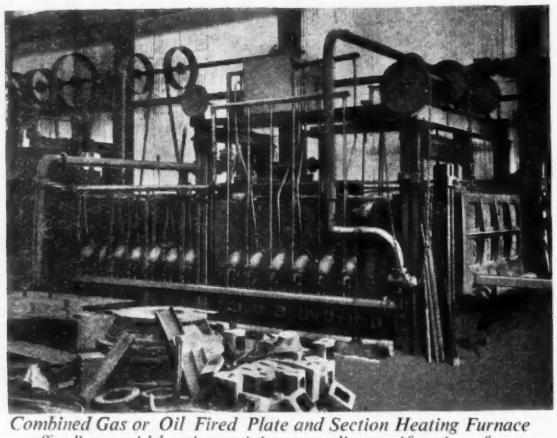


Recirculated Atmosphere Combined Normalizing and Tempering Furnace for railway tyres up to 7 ft. 6 in. in diameter, and solid wheels.

a gas fired plate heating furnace of similar temperature range is designed to meet the exacting conditions required for reheating steel and copper plates in locomotive manufacture. An electrically operated swivel type charging machine enables the load to be transferred from a position out of line with the furnace. Many combined gas or oil fired plate and section heating furnaces are in successful operation for angle and section heating, with the advantages of rapid heating, minimum scaling, uniformity of temperature and economy in fuel and maintenance costs.

Small coke fired furnaces are extensively used for heating billets and bars for forging or drop stamping purposes. Bar stock may be actively heated to a length of about 20 in., the required temperature being attained in 10 to 15 minutes from the time of lighting. The ash box is so designed that all ash, slag, or clinker can be completely discharged and a new fire built up in a few minutes. Temperatures up to 1,300°C. may be readily obtained with a special purpose rotary type unit for forging bar ends, bolt heads, rivets, &c. This type of furnace may be heated by either gas or oil, and the temperature is easily maintained to within 10°C., the atmosphere being soft and reducing. A compact and robust gas fired furnace unit is available for the clean heating of bars, light sections and billets for bending, forming, stamping and forging, with operating temperatures from 800 to 1,350°C.

Of a large range of forging furnaces, four typical installations are described. One is a battery of solid fuel fired furnaces operating at temperatures up to 1,400°C., suitable for heating large blooms, such as are required in the forging of locomotive connecting and coupling rods, crank axles, &c. Another is a continuous rotary hearth forging furnace suitable for lighter forgings, such as draw bars, draw bar hooks, brackets, brake shafts, suspension links, levers, &c. Outstanding features of this type of furnace include the close proximity of charge and discharge doors, easy handling of work of irregular shape, accuracy of temperature control, and compact design and rugged construction. A small forging furnace suitable for either continuous or intermittent use in the heating of billets for small forgings is useful in the maintenance workshop and may be used for many other purposes

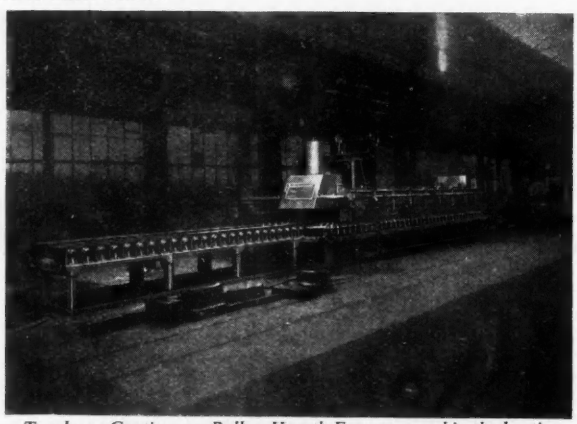


Combined Gas or Oil Fired Plate and Section Heating Furnace affording rapid heating, minimum scaling, uniformity of temperature and economy of fuel and maintenance costs.

in addition to forging, such as rivet heating, pre-heating for drop stamping, upsetting, &c. Details are also given of two forging furnaces fired by gas produced by the Patent Incandescent Unit Automatic Gas Machine. Such furnaces may be designed to take any size of forging.

The heat treatment of forgings is an operation of primary importance in the manufacture of railway locomotives and rolling stock, and the rigorous specifications for axles, crank axles, connecting and coupling rods and link rods have necessitated the production of specially accurate plant. Five noteworthy installations of this type of plant are described in the brochure. The manufacture of railway sorings is another important branch of railway engineering, and here again there is a wide range of plant available. For carburizing, tool hardening and other heat treatment operations in the tool room a large number of specially designed furnaces have been installed. Many oven furnaces are in intermittent use, designed as dual purpose units, to be used on occasion for carburizing, and at other times for general heat treatment work. Other units are designed for various heat treatment processes, such as annealing, normalizing, tempering and hardening. Special units operating at high temperatures with non-scaling atmospheres for the hardening of high speed steel tools have been developed, and these include both semi-muffle and complete muffle furnaces, the latter type operating with a controlled atmosphere generated by a special gas conditioning unit.

The whole of the Incandescent Group, comprising the Incandescent Heat Co., Ltd., the Selas Gas and Engineering Co., Ltd., Manchester, Metalectric Furnaces, Ltd., Smethwick, and Controlled Heat and Air, Ltd., London, contribute to the needs of the railway industry in the matter of foundry equipment, including cupolas, melting furnaces, crucible furnaces, annealing and malleableizing furnaces, plant for superheating cast iron, duplexing and core-drying ovens. Another important operation in railway shops is that of dealing with components requiring white metal surfaces, and a complete plant for this purpose has recently been installed by the Selas Gas and Engineering Co. in the workshops of a leading British railway. Circular furnaces for the normalizing and tempering of both railway tyres and solid wheels have been supplied. The patent Incandescent system of angential firing by high pressure gas burners combined with a fan recirculated atmosphere gives rise to the necessary turbulence for work of this character. A special apparatus, which may be fired by gas or oil, has been developed for heating steel tyres prior to shrinking on to wheel centres.



Two large Continuous Roller Hearth Furnaces used in the heating and tempering of laminated spring leaves.

GAS IN THE COLD-SET PRINTING PROCESS*

By H. W. SMITH, Jr. (American Gas Association)

PRINTING with " cold-set " ink—ink delivered as a solid but handled hot and molten right up to the instant it is transferred from the type to " freeze " on the paper—is so new that its debut into the high society of graphic arts processes dates from a report presented before the Technical Association of the Pulp and Paper Industry as recently as Feb. 21. Nevertheless, its attributes are so many that already a daily New York newspaper, as well as a first-rate magazine printing firm, are using it—and finding it worthy of every claim. The newspaper is the new pioneer in metropolitan journalism, *PM*. The magazine firm is the Art Color Printing Company at Dunellen.

In barest outline, solid ink is melted at 200°F. or above and maintained at this temperature through all ink conduits, fountains, or ink pumps, and ink rails. The ink cylinder is heated to keep the ink sufficiently fluid to distribute readily and pass over the intermediate rolls on to the plate cylinder as a liquid. The plate cylinder is also heated so that the plates are kept hot by contact and the ink maintained at 200°F. or better up to the very instant it touches the relatively colder paper and " freezes " thereon with virtually no penetration. It is claimed that the ink is actually " plucked " off the plate by " kiss " contact, much as wood might be coated by merely touching it to molten paraffin.

The fact that the ink freezes solid instantaneously on the paper without penetration and without the necessity of subsequently drying by absorption, evaporation, oxidation, or polymerization, accounts for : (1) The opacity, (2) the sharpness of characters and halftone dots, (3) the elimination of strike-through on even the thinnest of stocks, (4) the insurance against first-impression offset, and (5) the high web speeds permissible without long leads after plate contact and without interposed accelerated-drying-by-heat systems which may strain or distort the paper. The ink is heated only *before* it touches the paper, not *after* it is on the paper as in heat-set methods. The fact that the ink is solid at normal room temperatures and is not chemically changed in any way by alternate meltings and freezings accounts for : (6) The freedom from smudging, and (7) the elimination of the necessity of washing-up rails, cylinders, or plates (except for colour changes) between printing periods.

Obviously, the chief job in adapting any press to cold-set printing involves the installation of means of melting the ink ; keeping it sufficiently molten to flow easily through all conduits, fountains, pumps, rails, etc. ; and heating the ink cylinders and plate cylinders. At the Brooklyn *Daily Eagle* where *PM* is printed on two modified 4-unit Superproduction Hoe presses, a gas-fired water heater of somewhat special design delivers 800 gall. per minute of hot water at 228°F. and 10 lb. per sq. in. pressure to the heating jackets of the various ink pumps, each ink rail, and each ink cylinder. Another gas-fired water heater of identical design delivers a similar quantity of water at 250°F. and 16 lb. per sq.in. pressure to the heating jackets of all the ink-melting tanks and ink lines running therefrom to the press, as well as to the various plate cylinders—the higher temperature water being required at these locations in the interest of speed in ink melting and (in the case of the plate cylinder) in view of the fact that the surface of this cylinder does not heat the ink directly, but merely heats the ribbed stereotype plates which in turn must be hot enough to keep the ink transferred to them at the proper temperature and fluidity.

Water Heating System

Because of the unusual requirements of this pressure water heating system, three specially designed 25 h.p. boilers were adapted. Each of the three is fired by nine bar-burners capable of burning a total of 2,400 cu.ft. of 540 B.Th.U. gas per hour when full-on—and is insulated with magnesia block covered with finish mix. The vertical firetubes are so arranged (in special pattern) that the mercury bulb elements of the temperature controls can penetrate to the centre of each unit ; and (in view of the tremendous rate of water circulation through each unit) double inlet and outlet connexions are provided so that the water will not " short-circuit " and cause inadequate circulation around fire tubes (as might occur with a conventional single lower inlet and single upper outlet). Y-branches provide two diametrically opposite connexions for both the inlet water (bottom) and the outlet water (top). Motor-driven pumps accomplish the necessary rate of circulation.

The control system represents the very latest in both precision and safety for water heating installations operated at temperatures above 212°F.—and, to the best knowledge, is the first of its kind. It provides push-button ignition by a safety flame pilot—10,000 volts to ignite the pilot, after which the potential drops to 2,300 volts and the circuit continues to arc only if the pilot is on, this flow of current actuating a double-relay system to open the main gas valve. The relays, in turn, are connected to an on-and-off temperature-indicator and limit-control with maximum and minimum stops. This is a safety feature, not the main temperature control, although it could be so used in an emergency. As an additional safety factor there is a raw gas pilot system entirely independent of the electric pilot system.

* An extract from the *A.G.A. Monthly*

The main control is modulating and entirely separate from the ignition system. Thus gas is used only in proportion to the heat required in the press-room, no fuel for stand-by or maintenance being wasted, and temperature control is amazingly constant.

Still another safety feature is a dump valve at the low point of each circulating water system, actuated by a break-glass switch in the press-room and interconnected to a main gas shut-off valve. Further, should a pump fail, a relay would both set off an alarm in the head pressman's office and close the main gas line. Relief valves, gauges, &c., as required by safety codes are provided.

Most important of all, however, are the two closed hot water systems beyond the boilers and supplying heat (in the form of hot water) where it is needed in cold-set printing. The 250°F. system is the most circuitous. It serves the jacket of the ¼-in. welded-steel ink-melting tank, which is at least 10 ft. above the topmost point of the presses and is 28 in. deep by 49 in. long by 24 in wide. This tank has a pitched bottom and a central baffle. Both the baffle, the bottom and all sides are jacketed with the hot water under 16 lb. pressure, and insulated heavily with magnesia. Also served are three smaller ink-melting tanks for colours other than black.

This same 250°F. system serves the jackets for all the ink lines (½ in. or ¾ in. brass-pipe lines completely and centrally encased in welded 2 in. water line, even to the extent of drop lines, valves, &c.). No leakage or possibility thereof is permissible in view of the temperature and pressure of the water, and it is advised that as much of the ink-line jacketing as possible be pre-welded.

The 250°F. system further supplies the plate cylinders through axial connexions. In any case no more than 4°F. of water temperature is lost across the press. There is a supply and return header on either side of each press so that counter-flow on alternate cylinders can be attained. All hot water lines are heavily insulated with 2½ in. thick asbestos contained in sewed fabric.

To date the installation has been entirely satisfactory and surprisingly economical. Although it is estimated that the three boilers will use about 10,000,000 cu.ft. of gas annually, careful cost accounting, and estimates based upon actual tests with a smaller system preceding and pioneering for the main installation, show that total fuel costs will not exceed $1.04 per press hour. This amount distributed over the 32,000 papers which are printed per press hour is quite small as compared with other production costs. Almost no maintenance will be required in view of the completeness of automatic control, the safety features provided, and the cleanliness and space conservation of gas-burning systems.

Gas Undertaking Results

Burnley

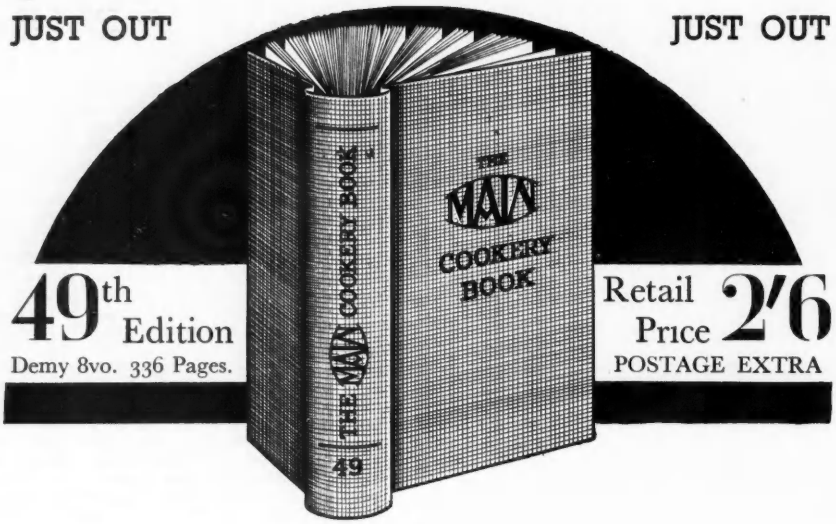
The decrease in the quantity of gas sold by the County Borough of Burnley Gas Department during the year ended March 31 last, as compared with the preceding twelve months, was 99,808,531 cu.ft., but 83,184,218 cu.ft. of this is accounted for by the reduced consumption for public lighting and private lamps, leaving a decrease of only 16,624,313 cu.ft. in the quantity sold by meter. At the end of March the number of meters in use was 40 less, at 32,739 (23,883 prepayment). In March the new wartime street lighting fittings were adopted, and 902 were installed on the main roads and omnibus routes. The gross profit for the year (£32,839) is equal to 10½% on the outstanding debt. The net profit of £2,846 compares with a net loss a year ago of £4,817.

Metropolitan of Melbourne

The Directors of the Metropolitan Gas Company of Melbourne, in their report for the year ended June 30, state that the accounts show a profit of £190,456, to be added to which is an amount brought forward of £79,407. After the payment of a final dividend at the same rate as before of 6s. 6d. per share, the balance forward remains practically the same as the sum brought into account. The amount transferred to Reserved Fund Account on this occasion is £10,000, which compares with £15,000 a year ago. The total quantity of gas sold during the year was 5,046,387,000 cu.ft., as against 4,713,751,000 cu.ft. in the preceding year.

A Joint Meeting of the Chemical Engineering Group (Society of Chemical Industry) in conjunction with the Institution of Chemical Engineers will be held on Tuesday, Dec. 10, at 2.30 p.m. in the Rooms of the Chemical Society, Burlington House, Piccadilly, W. 1, when a discussion on " The Salvage of Waste Materials in the Chemical Industry " will be opened by Dr. A. B. Manning. The Chair will be taken by the Chairman of the Chemical Engineering Group, Mr. H. W. Cremer. There will be an informal luncheon prior to the meeting at 12.45 p.m. for 1 p.m. at Stewart's Restaurant (corner of Piccadilly and Old Bond Street).

JUST OUT JUST OUT



49th Edition
Demy 8vo. 336 Pages.

Retail Price 2/6
POSTAGE EXTRA

The Subject of Nutrition

is of vital importance to the nation to-day. In the latest edition of the MAIN COOKERY BOOK there is a section dealing with the Nutrition Value and Selection of Foods, and a table of Edible Organic Nutrients, Mineral Elements and Vitamin Indications of many varieties of Foodstuffs.

But it still remains a Cookery Book with application to gas ovens generally, and users of cookers ***with or without*** thermostatic control will find it meets their own particular requirements.

New sections of Recipes have been added, and much information is embodied which will provide a store of good advice on cooking under present-day conditions.

Two desirable features:—The stiff cloth covers are washable, and the inside pages lie flat wherever the book is opened.

REVISED
REMODELLED
ENLARGED

MAIN

TRADE TERMS
SUPPLIED ON
APPLICATION

COOKERY BOOK

Published by

R. & A. MAIN LIMITED, LONDON AND FALKIRK

Gas Products Prices

The London Market

Nov. 18.

The prices of Tar Products in the London Market remain unaltered; they are to-day as follows: Pitch is nominal; creosote is about 4⅜d. to 5d. per gallon; refined tar 3⅜d. to 4d.; the price of pure toluene under the Ministry of Supply Toluene No. 2 Order is 2s. 5d. per gallon; pure benzole is 1s. 10d.; 95/160 solvent naphtha 1s. 11d. to 2s. 0d.; and 90/160 pyridine about 17s. 6d.; all per gallon naked; refined naphthalene crystals £23 per ton in bags; all *ex* Makers' Works.

The Provinces

Nov. 18.

The average prices of gas-works products during the week were: Pitch and Crude Tar,* Toluole, naked, North, 1s. 10d. (controlled by the Control of Toluene No. 2 Order, July 5, which fixes the maximum price at which this material may be sold). Coal tar, crude naphtha, in bulk, North 9½d. to 10d. Solvent naphtha, naked, North, 1s. 9d. to 1s. 10d. Heavy naphtha, North, 1s. 5d. to 1s. 6d. Creosote, *ex* works, in bulk, North liquid and salty, 4½d. to 4⅝d.; Scotland, 4½d. to 4⅝d.; low gravity, 4⅜d. to 4⅝d. Fuel Grade 4d. to 4½d. Carbolic acid, 60's, 3s. 9d. to 3s. 10½d. Naphthalene, £15 to £20. Salts, 75s. to 85s., bags included. Anthracene, "A" quality, 4½d. to 4⅝d. per minimum 40% purely nominal. Heavy oil: Unfiltered anthracene oil (min. gr. 1,080), 5½d. to 5⅝d.; filtered heavy oil (min. gr. 1,080), 5⅜d. to 6d.; heavy anthracene oil gr. less than 1,080, 6d. to 6½d.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note in our issue of Sept. 4, p. 404.

Tar Products in Scotland

GLASGOW, Nov. 16.

Business continues quite active in both home and export markets. Prices show no material alteration during the week.

Refined tar.—For home delivery price is about 4½d. to 4⅝d. per gallon, while for export business is being concluded at 3½d. per gallon, both f.o.r. naked.

Creosote oil.—The position as a whole is satisfactory, with prices steady as under: Specification oil, 5d. to 5⅛d. per gallon; low gravity, 6d. to 6½d. per gallon; neutral oil, 5⅛d. to 6d. per gallon; all *ex* Works in bulk.

Cresylic acid.—Very little business is being concluded and prices are easier as follows: Pale, 99/100%, 2s. 1d. to 2s. 3d. per gallon; Pale, 97/99%, 1s. 10d. to 1s. 11d. per gallon; Dark, 97/99%, 1s. 6d. to 1s. 8d. per gallon; all *ex* Works in buyers' packages.

Crude naphtha is changing hands at 6½d. to 7½d. per gallon *ex* Works in bulk, according to quality.

Solvent naphtha.—90/160 grade is 1s. 8½d. to 1s. 9d. per gallon, and 90/190 Heavy Naphtha is 1s. 4½d. to 1s. 5½d. per gallon.

Motor benzole is 1s. 9d. to 1s. 9½d. per gallon.

Pyridine remains at 17s. to 18s. per gallon for 90/160 grade and 19s. to 20s. per gallon for 90/140 grade.

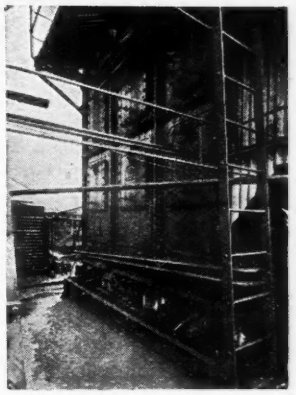
According to the Annual Report of the Manchester Highways Committee, expenditure on street gas lighting was £46,454, and on street electric lighting £41,777 in the year to March 31 last. The quantity of gas used decreased from 495,179,690 cu.ft. to 160,357,000 cu.ft.

THIS WEEK'S ADVERTISERS

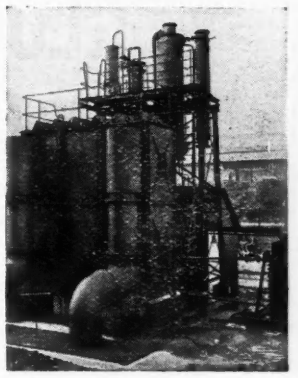
	PAGE
Alder and Mackay, Ltd.	346
Baldwins, Ltd.	323
Bale & Church, Ltd.	350
Blakeley, Firth, Sons, & Co., Ltd.	349
Bratt Colbran, Ltd.	316
British Gas Purifying Materials Co., Ltd.	350
Cohen, George, Sons & Co., Ltd.	349
Cowan, W. & B.	Cover III
Crane, Ltd.	315
Crookston, S., & Co.	346
Cutler, Samuel, & Sons, Ltd.	337
Dempster, R. & J., Ltd.	Cover I
Dempster, Robert, & Sons, Ltd.	349
Dick, R. & J., Ltd.	318
Donkin Co., Ltd. (The Bryan)	Cover II
Ellison Insulations, Ltd.	349
Ether, Ltd.	318
Evans, Joseph, & Sons (Wolverhampton), Ltd.	320
Expanded Metal Co., Ltd.	Cover II
Falk, Stadelmann & Co., Ltd.	321
Fluxite, Ltd.	350
Frost, A. E.	350
Gas Meter Co., Ltd.	347
Gas Purification and Chemical Co., Ltd.	349
Glenboig Union Fireclay Co., Ltd.	317
Glover, George, & Co., Ltd.	313
Glover, Thos., & Co., Ltd.	326
Goodall, Clayton, & Co., Ltd.	Cover IV
Grant, David, & Co.	320
Green & Boulding, Ltd.	350
Hamilton, Archd. H., & Co., Ltd.	346
Holmes, W. C., & Co., Ltd.	351
Horseley Bridge and Thos. Piggott, Ltd.	317
Humphreys & Glasgow, Ltd.	324
Jeavons, E. E., & Co., Ltd.	349
Jenkins, W. J., & Co., Ltd.	322
Keay, E. C. & J., Ltd.	352
Keith Blackman, Ltd.	352
King, Walter, Ltd.	346, 349
Kings Patent Agency, Ltd.	350
Kirkham, Hulett, & Chandler, Ltd.	321
Le Bas Tube Co., Ltd.	319
Main, R. & A., Ltd.	342
Menno Compressed Air Greasecup Co., Ltd.	348
Mewburn, Ellis & Co.	350
Mitchell, H., & Co.	321
Newton Chambers & Co., Ltd.	334
Parkinson, W., & Co.	326
Peckett & Sons, Ltd.	348
Pulsometer Engineering Co., Ltd.	Cover IV
Radiation, Ltd.	338, 339
Reavell & Co., Ltd.	348
Ruscoe, John, & Co., Ltd.	348
Siebe, Gorman & Co., Ltd.	346
Sisson, W., & Co., Ltd.	323
Smith, Thos., & Sons (Rodley), Ltd.	321
Sperryn & Co.	325
Stein, John G., & Co., Ltd.	347
Strachan & Henshaw, Ltd.	313
Sutcliffe, Speakman & Co., Ltd.	319
Terry, Herbert, & Sons, Ltd.	346
Thomas & Bishop, Ltd.	343
Trotter, Haines, & Corbett, Ltd.	350
Walker, C. & W., Ltd.	337
Waller, Geo., & Son, Ltd.	314
West's Gas Improvement Co., Ltd.	344
West's Piling and Construction Co., Ltd.	Cover IV
Woodall-Duckham Co., Ltd.	333

Contracts Open	350
Educational	350
Patents	350
Plant, &c.	349
Plants, &c., Wanted and for Sale	350
Technological Institute	350

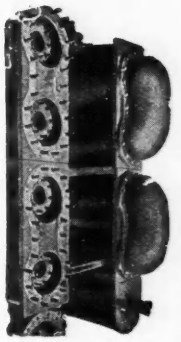
PERMAC JOINTS



"Permac" Joints in a Gas Works



"Permac" Joints in a Gas Works



"Permac" Joints. Steam and Benzol Pipes on a Benzol Super-Heater Coke Oven By-Product Plant

"Permac" Metal-to-Metal Jointing is equally suitable for any kind of joint—steam, water, gas, oil. Stands up to all temperatures and pressures. Send for particulars

THOMAS & BISHOP LTD
37 TABERNACLE ST LONDON, E.C.2

For every size of works and every class of coal...

WEST'S

CARBONIZING PLANTS

GLOVER-WEST VERTICALS

WESTVERTICAL CHAMBERS

440 carbonizing plants have been built or are under construction by West's in 24 countries. Working results from a wide variety of gas coals have established the high efficiency and adaptability of the West systems.

WEST'S

GAS IMPROVEMENT CO · LTD ·

MILES PLATTING MANCHESTER 10

TELEPHONE—COLLYHURST 2961-2-3-4-5 · TELEGRAMS—STOKER, MANCHESTER

LONDON OFFICE TEMPORARY ADDRESS—BATH ROAD · HARMONDSWORTH · WEST DRAYTON · MIDDLESEX TEL.—WEST DRAYTON 2288-9

GAS STOCKS AND SHARES

There was a fair sprinkling of business in the Gas Market last week, and with few exceptions prices remained unchanged. Several parcels of Imperial Continental changed hands, and the quotation closed 1 up at 37½. The only other change of note in the Official List was a drop of 3 in Tottenham ordinary to 67. On the Provincial Exchanges Bristol ordinary hardened 2½ to 91, and in the Supplementary List North Middlesex 5% preference closed 2 points higher at 89½.

In the "JOURNAL" of Oct. 30 a list was given showing the falls in value sustained by a number of leading ordinary stocks since the outbreak of war. Most of the fixed-interest stocks have also suffered severely, although not to the same extent as the "ordinaries," but it will be noticed that the Commercial and Gas Light 3% debenture stocks show small increases. The following table illustrates the extent of the loss :

	Prices.		
	Pre-War.	Present.	Rise (+) or Fall (−).
Commercial 3% deb.	58½	60½	+ 2
,, 5% deb.	105½	90½	−15
Croydon 5% deb.	109½	92½	−17
Gas Light 4% pref.	89½	72½	−17
,, 3¾% red. pref.	92½	82½	−10
,, 3% deb.	66½	67½	+ 1
,, 5% red. deb.	107½	102½	− 5
,, 4¼% ,,	105½	100½	− 5
,, 3¼% ,,	105½	100½	− 5
South Metropolitan 6% pref.	117½	100	−17½
,, ,, 3% deb.	70½	62½	− 8
,, ,, 5% red. deb.	105½	97½	− 8
South Suburban 5% pref.	103½	90½	−13
,, ,, 4% pref.	85½	65	−20
,, ,, 5% deb.	107½	92½	−15
Tottenham 4% deb.	89½	80½	− 9
Wandsworth 4% pref.	84½	65	−19½
,, 5% deb.	105½	92½	−13

Quotations on the London and Provincial Stock Exchanges

OFFICIAL LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Nov. 14.	Rise or Fall on week.
1,767,439	Sept. 16	7	7	Alliance & Dublin Ord. ...	102—112	...
374,000	July 1	4	4	Do. 4 p.c. Deb. ...	90—95	...
957,608	Nov. 4	5	5	Asscd. Gas & Water U'd'ts Ord.	12/—14/-*	...
500,000	,,	4½	4½	Do. 4½ p.c. Red. Cum. Pref.	15/6—17/6*	...
535,545	,,	4	4	Do. 4 p.c. Red. Cum. Pref.	14/6—16/6*	...
336,646	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	12/—14/-*	...
561,370	Aug. 12	7	7	Barnet Ord. 7 p.c.	100—105	...
300,000	Oct. 14	1/9⅜	1/4⅛	Bombay, Ltd.	19/6—21/6	...
690,407	Aug. 19	7	7	Bournemouth 7 p.c. max. ...	100—110	...
362,025	June 17	4	4	Do. 4 p.c. Deb. ...	75—85	...
659,955	Aug. 19	6¾	4¾	Brighton, &c., 5 p.c. Con. ...	65—75	...
855,000	Sept 30	8	6	Brit. Gas Light Ord.	75—85	...
545,000	June 17	5½	5½	Do. 5½ p.c. 'B' Cum. Pref	110—115	...
120,000	,,	4	4	Do. 4 p.c. Red. Deb.	75—80	...
10,000	Nov. 6, '33	6	4	Cape Town, Ltd., 4½ p.c. Cu. Pf.	¼—¾	...
626,860	July 15	5⅞	6	Cardiff Con. Ord.	89—94	...
24,500	Sept. 23	7	7	Colombo Ord. 7 p.c. Pref. ...	19/—21/-	...
764,169	Oct. 7	-/11.48	-/11.48	Colonial Gas Assn. Ltd. Ord. ...	14/—16/-	...
400,000	,,	1/3.30	1/3.30	Do. 8 p.c. Pref. ...	19/—21/-	...
1,748,935	July 22	2	3	Commercial Ord.	37—42	...
620,000	June 10	3	3	Do. 3 p.c. Deb.	58—63	...
286,344	Aug. 19	5	5	Do. 5 p.c. Deb.	88—93	...
807,560	Aug. 12	7	6	Croydon sliding scale	83—88	...
644,590	,,	5	5	Do. max. div.	90—85	...
620,385	July 1	5	5	Do. 5 p.c. Perp. Deb. ...	90—95	...
179,500	Aug. 19	5⅜	5	East Surrey 'B,' 5 p.c.	75—80	...
176,461	June 17	5	5	Do. 5 p.c. Deb. (Irred.)...	90—95	...
250,000	Nov. 11	4	6	Gas Consolidation Ord. 'B' ...	13/6—14/6*	...
250,000	Nov. 11	4	4	Do. 4 p.c. Red. Cum. Pref.	15/—17/-*	...
19,152410	July 29	3½	4½	Gas Light & Coke Ord. ...	13/6—14/6a	...
2,600,000	,,	3½	3½	Do. 3½ p.c. max.	50—55	—2
4,477,106	,,	4	4	Do. 4 p.c. Con. Pref. ...	70—75	...
2,993,000	July 8	3½	3½	Do. 3½ p.c. Red. Pref. ...	80—85	...
8,602,497	June 3	3	3	Do. 3 p.c. Con. Deb. ...	65—70	...
3,642,770	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—105	...
3,500,000	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	98—103	...
700,000	Sept. 9	3½	3½	Do. 3½ Red. Deb. ...	80—85	...
5,600,000	May 13	4	8	Imperial Continental Cap. ...	35—40	+1
43,820	July 29	3½	3½	Do. 3½ p.c. Red. Deb. ...	63—68	...
231,978	Aug. 19	5	5	M.S. Utility 'C' Cons.	68—73	...
918,657	,,	4	4	4 p.c. Cons. Pref.	72—77	...
675,000	Nov. 11	14	†4	Montevideo, Ltd.	52—57*	...
300,000	Apl. 29	9	7	Oriental, Ltd.	100—110	...
368,537	June 3	7	8	Plymouth & Stonehouse 5 p.c.	90—100	...
621,667	Aug. 19	8½	7½	Portsmouth & Gosport Cons.	97—102	...
648,999	Sept. 16	1/1	1/1½	Severn Val. Gas Cor. Ld. Ord.	13/—15/-	...
597,972	,,	-/10⅛	-/10⅝	Do. 4½ p.c. Cum. Pref. ...	15/6—17/6	...
2,528,714	Sept. 2	1/-	-/7½	South East'n Gas Cn. Ld. Ord.	9/—11/-	...
1,000,000	,,	-/10½	-/10⅝	Do. 4½ p.c. Red. Cum. Pref.	14/—16/-	...
1,068,869	,,	4	4	Do. 4 p.c. Irred. Cum. Pref.	13/—15/-	...
6,709,895	Aug. 5	4	4	South Met. Ord.	53—58	...
1,135,812	,,	6	6	Do. 6 p.c. Irred. Pref. ...	95—105	...
850,000	,,	4	4	Do. 4 p.c. Irred. Pref. ...	65—75	...
1,895,445	July 1	3	3	Do. 3 p.c. Perp. Deb. ...	60—65	...
1,000,000	July 15	5	5	Do. 5 p.c. Red. Deb. ...	95—100	...
1,543,795	July 22	3	4	South Suburban Ord. 5 p.c. ...	60—70	...
512,825	July 8	5	5	Do. 5 p.c. Perp. Pref. ...	88—93	...
500,000	,,	4	4	Do. 4 p.c. Perp. Pref. ...	60—70	...
250,000	,,	3¾	3¾	Do. 3¾ p.c. Red. Pref. ...	80—85	...
888,587	June 10	5	5	Do. 5 p.c. Perp. Deb. ...	90—95	...
750,541	Aug 9	5½	5	Southampton Ord.	58—63	...
350,000	Feb. 12	5½	5½	Swansea 5½ p.c. Red. Pref. ...	91—96	...
1,076,495	Aug. 5	5	5	Tottenham & District Ord. ...	62—72	—3
338,555	,,	5	5	Do. 5 p.c. Pref.	75—85	...
453,380	June 10	4	4	Do. 4 p.c. Perp. Deb. ...	78—83	...
1,247,505	May 20	4	6	U. Kingdom Gas Cor. Ord. ...	12/—14/-	...
1,085,952	May 13	4½	4½	Do. 4½ p.c. 1st Cum. Pref. ...	13/6—15/6	...
772,709	,,	4	4	Do. 4 p.c. 1st Red. Cum.Pref.	13/—15/-	...
745,263	June 17	4½	4½	Do. 4½ p.c. 2nd Non.Cum. Pf.	12/6—14/6	...
1,200,000	Sept. 9	3½	3½	Do. 3½ p.c. Red. Deb. ...	82—87	...
380,606	Aug. 5	7	6⅝	Uxbridge, &c., 5 p.c.	80—90	...
1,371,138	July 8	3½	4	Wandsworth Consolidated ...	62—72	...
2,525,768	,,	4	4	Do. 4 p.c. Pref.	60—70	...
1,343,964	June 17	5	5	Do. 5 p.c. Deb.	90—95	...
383,745	,,	4	4	Do. 4 p.c. Deb.	80—85	...
558,342	July 15	6	5	Watford & St. Albans Ord. ...	88—93	...
300,000	June 10	3½	3½	Do. 3½ p.c. Red. Deb. ...	85—90	...

SUPPLEMENTARY LIST

Issue. £	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations Nov. 14.	Rise or Fall on week.
351,685	June 17	5	5	Brighton, &c., 5 p.c. Perp. Deb.	90—95	...
28,700	,, 17	5½	5½	Do. 5½ p.c. Red. Deb. 1942...	96—101	...
415,250	,, 17	4	4	Bristol Gas Co., 4 p.c. New Deb.	85—90	...
140,205	July 29	7	7	Cambridge, &c., 7 p.c. Cons. 'B'	100—110	...
295,932	Aug. 19	5	5	Cheltenham, 5 p.c. Cons. Ord....	88—93	...
42,500	July 1	4	4	Do. 4 p.c. Perp. Deb....	82—87	...
150,000	Aug. 12	4	4	Croydon Gas, 4 p.c. Pref. (Irr.)	70—75	...
130,000	July 1	4	4	Do. 4 p.c. Deb. ...	75—80	...
146,700	Aug. 19	5½	5½	East Surrey, 5½ p.c. Pref. 'A' ...	90—95	...
53,220	,, 19	6	6	Do. 6 p.c. Cum. Pref. ...	95—100	...
117,425	Feb. 5	8	8	East Wight, 5 p.c. Cons. Ord. ...	100—110	...
...	Aug. 19	6	4	Eastbourne, 'B' 3½ p.c.... ...	65—75	...
239,135	Nov. 11	5	5	Gas Consolidation 'A' Ord. (£1)	13/—15/-*	—6
156,600	Aug. 19	5	5	Hampton C't, 5 p.c. Cons. Ord.	68—73	...
18,000	June 10	7	7	Malta & Med'n., 7 p.c. 1st Pref.	60—65	...
10,845	,, 10	7½	7½	Do. 7½ p.c. 2nd Pref.	60—65	...
50,000	Aug. 19	£5 19 6	£5 4 6	Mid. South. Util., 'A' Cons. 5 p.c.	63—73	...
65,000	Aug. 12	5	5	North Middlesex, 5 p.c. Pref. ...	87—92	+2
70,000	Sept. 9	5	5	Plymouth & Stone., 5 p.c. Deb.	87—92	...
76,501	July 1	4	4	Reading, 4 p.c. Perp. Deb. ...	75—80	...
74,777	Sept. 30	4	4	Romford, 4 p.c. Debs. (Reg.) ...	77—82	...
21,000	June 10	5	5	Slough, 5 p.c. Perp. Deb. ...	90—95	...
211,740	,, 17	5	5	Southampton, 5 p.c. Red. Deb.	96—101	...
363,575	July 1	5	5	Tottenham, 5 p.c. Reg. Red. Mt.	95—100	...
202,019	Oct. 14	6¼	6¼	Tunbridge Wells, 4 p.c. Scale ...	70—80	...
135,257	June 10	5	5	Uxbridge &c., 5 p.c. Perp. Deb.	90—95	...

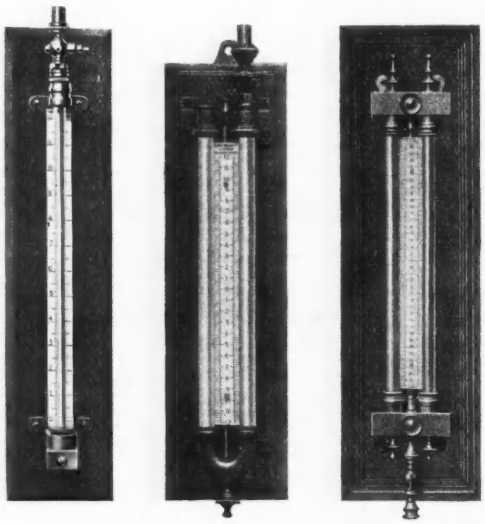
PROVINCIAL EXCHANGES

					Quotations Nov. 8.	
47,756	July 26	6	5	Bath Cons.	95—100	—3
122,577	July 22	7	6	Blyth 5 p.c. Ord.	100—105	...
1,667,250	July 15	5	5	Bristol, 5 p.c. max.	90—92	+2½
120,420	June 17	4	4	Do. 1st 4 p.c. Deb.	94—96	...
415,250	,,	4	4	Do. 2nd 4 p.c. Deb. ...	92—95	...
328,790	,,	5	5	Do. 5 p.c. Deb.	108—111	...
157,150	Aug. 5	6½	5	Chester 5 p.c. Ord.	98—101	...
92,500	June 17	4	4	Do. 4 p.c. Pref.	80—85	...
36,430	,,	3½	3½	Do. 3½ p.c. Deb.	80—85	...
41,890	,,	4	4	Do. 4 p.c. Red. Deb. ...	94—98	...
542,270	Aug. 12	9	6	Derby Cons.	100—105	...
55,000	June 10	4	4	Do. 4 p.c. Deb.	96—102	...
10,000	Aug. 19	10	10	Great Grimsby 'A' Ord. ...	170—180	...
6,500	,,	10	10	Do. 'B' Ord.	170—180	...
79,000	,,	10	10	Do. 'C' Ord.	160—170	...
732,000	Aug. 26	4	4	Hartlepool G. & W. Cn. & New	63—68	...
2,167,410	Aug. 19	6	6	Liverpool 5 p.c. Ord.	94—96	...
245,500	June 17	5	5	Do. 5 p.c. Red. Pref. ...	97½—100½	...
306,083	July 15	4	4	Do. 4 p.c. Deb.	99—101	...
20,000	June 24	5	5	Long Eaton 5 p.c. Pref.	9—11	...
80,000	June 24	5	5	Do. 5 p.c. Deb.	100—105	...
2,430,267	July 29	5 7/10	5	Newcastle and Gateshead Con.	15/6—16/6a	...
682,856	,,	4	4	Do. 4 p.c. Pref.	74—76	...
776,706	Dec. 27	3½	3½	Do. 3½ p.c. Deb.	80—85	...
277,285	April 24	5	5	Do. 5 p.c. Deb. '43 ...	97—102	...
274,000	July 26	5	5	Newport (Mon.) Ord.	89—93	...
13,200	Sept. 16	8⅔	7	Pontyp'l Gas & W. 10 p.c. 'A'	11½—12½	...
13,600	,,	6	5	Do. 7 p.c. 'B'	9½—10½	...
40,000	,,	5	6	Do. 7 p.c. 'C'	9½—10½	...
106,280	Aug. 5	8	10	Preston 'A' 10 p.c.	157—167	...
188,219	,,	7	7	Do. 'B' 7 p.c.	113—123	...
1,806,339	Aug. 26	6½	6½	Sheffield Cons.	118—120	...
95,000	July 8	4	4	Do. 4 p.c. Deb.	97— 99	...
332,351	Feb. 5	6	6	Sunderland 6 p.c. max. ...	107—112	...
140,778	Aug. 12	5	5	Weston-super-Mare Cons.	80—85	...
64,338	June 24	4	4	Do. 4 p.c. Deb.	75—85	...
33,340	,,	7½	7½	Do. 7½ p.c. Deb.	137—145	...

a.—The quotation is per £1 of Stock. * Ex. div. † Price free of income-tax.

PRESSURE GAUGES

WATER COLUMN TYPE



Supplied in U-type or Single Column, with aluminium, chromium-plated brass or bronzed brass mountings, in sizes ranging from 6″ to 48″. They can be calibrated for pressure, vacuum or differential readings. Great care has been taken to ensure absolute accuracy in these gauges, and they can be supplied mounted on backboards singly or in batteries.

ALDER & MACKAY LTD.

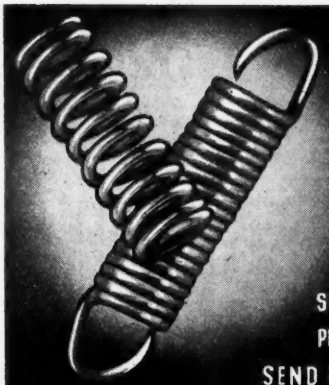
EDINBURGH - LONDON - BRADFORD & BRANCHES

The Cheapest Paints per Year of Protection

"GAUNTLET" 218 ENAMELS

Definitely One-Coat Enamels for all inside and outside decoration and protection at economic prices.

ARCHD. H. HAMILTON & Co. Ltd.
BARDOWIE STREET, POSSILPARK, GLASGOW, N.



TERRY'S SPRINGS FOR ALL PURPOSES

SPRING WASHER AND PRESSWORK SPECIALISTS
SEND FOR OUR CATALOGUE

HERBERT TERRY & SONS LIMITED, REDDITCH, ENG.

"Everything for Safety Everywhere."

SMOKE HELMETS. GAS MASKS.
BREATHING APPARATUS OF ALL PATTERNS.
OXYGEN RESUSCITATING APPARATUS.
FIRE EXTINGUISHERS. FIRST-AID OUTFITS.
SAFETY AND PROTECTIVE APPLIANCES OF ALL DESCRIPTIONS.

SIEBE, GORMAN & CO. LTD.,
WESTMINSTER BRIDGE ROAD, LONDON, S.E.1.
Telegrams: "Siebe, Lamb, London" Telephone No.: Waterloo 6011

ERECTION WORK

GAS HOLDERS. OIL TANKS. STEEL BUILDINGS. CAST IRON TANKS. PURIFIERS. MAIN LAYING. PAINTING.
Sub Contractors for any Erection Work.
REPAIRS, RE-SHEETING, DISMANTLING, & RE-ERECTION INSPECTIONS.

S. CROOKSTON & CO.
Contractors
HORNTON, BANBURY, OXON.

CASES FOR BINDING
QUARTERLY
VOLUMES OF THE "JOURNAL."

Walter King, Ltd., "Gas Journal" Offices, 51, High Street, Esher, Surrey.

CONTENTS

EDITORIAL NOTES

A Thought on Safety 369
Encouraging Work 369
Notes for Air Raid Wardens 370
Maintaining Goodwill 370
Gas for Motor Transport 370
An Example of Co-operation 370

Personal 370

Obituary :
C. Valon Bennett 371
Steel Tubes and Tubulars 371
George Wilson Gas Meters, Ltd. .. 371
Forthcoming Engagements 371
B.C.G.A. Lecture Service 372
Lighting of Mills 372
A Record of Achievement 372
Association of Public Lighting Engineers 373
High Pressure Plant and the Properties of Fluids at High Pressures .. 373

Gas Appliances for Garages 373
Coke Oven Managers' Association : Presidential Address of T. P. Carr .. 374
Gas Flow in Fuel Beds. By J. G. Bennett and R. L. Brown 378
Ignition of Gas Producers 386

Products Prices 387

Gas Stocks and Shares 389
Stock and Share Lists 389

TERMS OF SUBSCRIPTION.—*United Kingdom and Ireland : Advance Rate 35/- per annum ; 18/- per half year. Credit Rate : 40/- per annum ; 21/- per half year. Dominions and Colonies and United States : 35/- per annum, in advance. Other Countries in the Postal Union, 40/- per annum, in advance. A copy of the "G.J." Calendar and Directory is presented to continuous subscribers.*

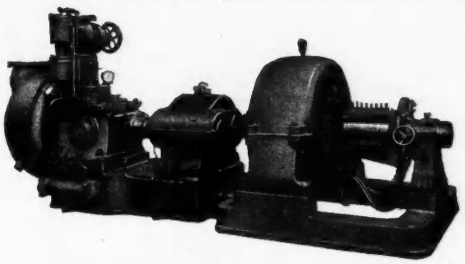
CLASSIFIED ADVERTISEMENTS.—*Situations Wanted, 6d. a line (minimum 3/-, about 36 words). Situations Vacant, Plant for Sale and Wanted Contracts, Public Notices, Educational, &c., 9d. a line (minimum 4/6). Financial Notices, 1/- per line. Box Number, 6d. extra. WALTER KING, LTD., 51, High Street, Esher, Surrey. Telephone : Esher 1142.*

Advertisement Index, see p. 387.

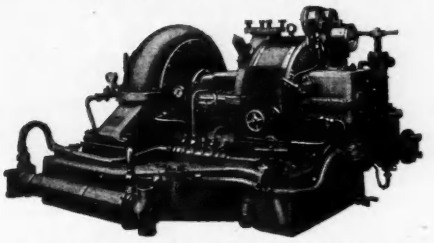
BROTHERHOOD
STEAM TURBINES FOR GASWORKS

Our Turbines, made for all powers up to 15,000 B.H.P. and for all conditions of service, are installed for driving Exhausters, Boosters, and Generators in many Gas Works, including:—

The Gas Light & Coke Co., South Suburban Gas Co., Wandsworth & District Gas Co., and in Works of Corporations and Companies at—Birmingham, Bristol, Coventry, Cardiff, Exeter, Liverpool, Manchester, Newcastle-on-Tyne, Preston, Portsmouth, Sheffield, Smethwick, Toronto, etc.



300 kW Back Pressure Geared Turbo-Generator.



Exhauster driven by 150 B.H.P. Steam Turbine at 13,000 r.p.m.

Brotherhood plant for Gas Works also includes Reciprocating Boosters, Water Coolin Towers, Air and Gas Compressors for all pressures and capacities.

PETER BROTHERHOOD LTD.

PETERBOROUGH :: Branch Offices in LONDON, LEEDS, MANCHESTER and GLASGOW

§§§

for

mechanically-lubricated

meters

THOMAS GLOVER & Co. LTD.

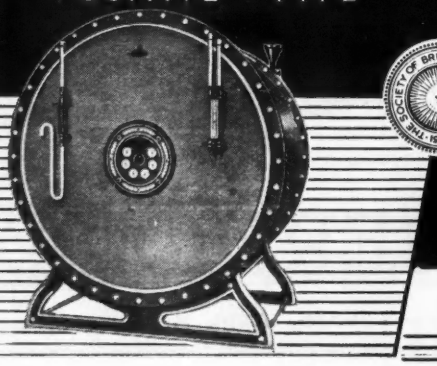
EDMONTON, LONDON, N.18 AND BRANCHES

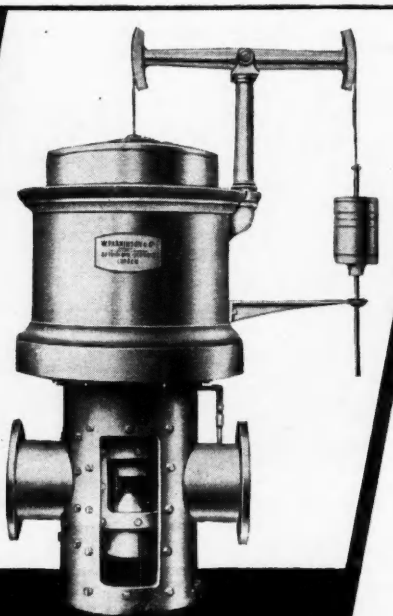
PARKINSON

STATION GOVERNORS

STATION METERS

"POSITIVE" TYPE





THE SOCIETY OF BRITISH GAS INDUSTRIES 1905

W. PARKINSON & CO.

(Incorporated in Parkinson & Cowan (Gas Meters) Ltd.)

COTTAGE LANE WORKS,
CITY ROAD, LONDON, E.C.1

Also at

BIRMINGHAM AND BELFAST

P.6